

SECTION A. DETAILED STATISTICAL TABLES

	<i>Page</i>
TABLE NOTES	9
TABLES	11

TOTAL FUNDS FOR R&D

A-1. Trends in industrial R&D performance, by source of funds, in current and in constant dollars: 1953-98	11
A-2. Summary data for R&D-performing companies, by detailed industry and by size of company: 1997-98	13
A-3. Total (company, Federal, and other) funds for industrial R&D performance, by industry and by size of company: 1988-98	17
A-4. Total (company, Federal, and other) funds for industrial R&D performance, by industry and by size of company: 1998	20
A-5. Total (company, Federal, and other) funds for industrial R&D performance, by industry, by size of company, and by size of company's total R&D program: 1998	23
A-6. Number of R&D-performing companies, by industry, by size of company, and by size of company's total R&D program: 1998	26

COMPANY AND OTHER (EXCEPT FEDERAL) FUNDS FOR R&D

A-7. Company and other (except Federal) funds for industrial R&D performance, by industry and by size of company: 1988-98	29
A-8. Company and other (except Federal) funds for industrial R&D performance, by industry and by size of company: 1998	32
A-9. Company and other (except Federal) funds for industrial R&D contracted to outside organizations by R&D-performing companies, by industry and by size of company: 1991, 1993-98	35
A-10. Number of R&D-performing companies contracting company and other (except Federal) industrial R&D to outside organizations and total number of R&D-performing companies, by industry and by size of company: 1998	38
A-11. Company and other (except Federal) funds for R&D performed outside the United States by U.S. R&D-performing domestic companies and their foreign subsidiaries, by industry and by size of company: 1988-98	41
A-12. Company and other (except Federal) industrial R&D performed outside the United States by U.S. R&D-performing domestic companies and their foreign subsidiaries, by country: 1998	45

<i>Table</i>	<i>Page</i>
FEDERAL FUNDS FOR R&D	
A-13. Federal funds for industrial R&D performance, by industry and by size of company: 1988-98	46
A-14. Federal funds for industrial R&D performance, by industry and by size of company: 1998	49
A-15. Federal funds for industrial R&D performance, by selected agency and by selected industry for selected years: 1979-98	52
A-16. Total number of R&D-performing companies and number reporting Federal R&D funds, by industry and by size of company: 1998	54
A-17. Industry-administered federally funded R&D centers (FFRDC's)—R&D funds by character of work, full-time-equivalent (FTE) R&D scientists and engineers, and total number of employees: 1988-98	57
R&D FUNDS BY SIZE OF COMPANY AND AS A PERCENTAGE OF NET SALES	
A-18. Total (company, Federal, and other) funds for industrial R&D performance and number of R&D-performing companies in manufacturing and nonmanufacturing industries, by size of company: 1998	58
A-19. Concentration of total, Federal, and company and other industrial R&D funds and net sales of R&D-performing companies, ranked by size of R&D program: 1988-98	59
A-20. Domestic net sales of R&D-performing companies, by industry and by size of company: 1997-98	60
A-21. Total (company, Federal, and other) industrial R&D funds as a percent of net sales in R&D-performing companies, by industry and by size of company: 1988-98	66
A-22. Company and other (except Federal) industrial R&D funds as a percent of net sales in R&D-performing companies, by industry and by size of company: 1988-98	69
A-23. Total (company, Federal, and other) industrial R&D funds as a percent of net sales in R&D-performing companies, by industry and ranked by size of total R&D program: 1998	72
A-24. Company and other (except Federal) industrial R&D funds as a percent of net sales in R&D-performing companies, by industry and ranked by size of company-financed R&D program: 1998	75
A-25. Federal industrial R&D funds as a percent of net sales in R&D-performing companies, by industry and ranked by size of federally financed R&D program: 1998	78
FUNDS FOR BASIC RESEARCH, APPLIED RESEARCH, AND DEVELOPMENT	
A-26. Total (company, Federal, and other) funds for performance of industrial basic research, applied research, and development, in current and in constant dollars: 1953-98	81
A-27. Company and other (except Federal) funds for performance of industrial basic research, applied research, and development, in current and in constant dollars: 1953-98	83

<i>Table</i>	<i>Page</i>
A-28. Federal funds for performance of industrial basic research, applied research, and development, in current and in constant dollars: 1953-98	85
A-29. Funds for performance of industrial basic research, applied research, and development, by industry and by source of funds: 1998	87
A-30. Number of companies conducting industrial basic research and total number of R&D-performing companies, by industry and by size of company: 1998	90
A-31. Total (company, Federal, and other) funds for industrial energy R&D performance, by industry and by size of company: 1988-98 and projected 1999	93
A-32. Company and other (except Federal) funds for industrial energy R&D performance, by selected industry: 1988-98 and projected 1999	97
A-33. Federal funds for industrial energy R&D performance, by selected industry: 1988-98 and projected 1999	98
A-34. Total (company, Federal, and other) funds for industrial energy R&D performance, by primary energy source: 1988-98 and projected 1999	99
A-35. Company and other (except Federal) funds for industrial energy R&D performance, by primary energy source: 1988-98 and projected 1999	100

ENERGY R&D

A-36. Federal funds for industrial energy R&D performance, by primary energy source: 1988-98 and projected 1999	101
A-37. Number of companies performing industrial energy R&D and total number of R&D-performing companies, by industry and by size of company: 1998	102

GEOGRAPHIC DISTRIBUTION AND DISTRIBUTION BY TYPE OF R&D COST

A-38. Total (company, Federal, and other) funds for industrial R&D performance by State for selected years: 1979-98	105
A-39. Total (company, Federal, and other) funds for industrial R&D performance, by State and by source of funds: 1998	107
A-40. Total (company, Federal, and other) funds for industrial R&D performance, by industry and by size of company, for the U. S. and top 10 R&D-performing States: 1998	109
A-41. Total (company, Federal, and other) funds for industrial R&D performance, by industry, by size of company, and by type of cost: 1998	113

<i>Table</i>		<i>Page</i>
R&D EMPLOYMENT		
A-42.	Number of full-time-equivalent (FTE) R&D scientists and engineers in R&D-performing companies, by industry and by size of company: 1988-99	116
A-43.	Number of full-time-equivalent (FTE) R&D scientists and engineers in R&D-performing companies, by industry, by size of company, and by source of R&D funds: January 1999	119
A-44.	R&D funds per scientist or engineer in R&D-performing companies, by industry and by size of company: 1988-98	121
A-45.	R&D funds per scientist or engineer in R&D-performing companies, by industry and by size of company: 1998	125
A-46.	R&D funds per scientist or engineer in R&D-performing companies ranked by size of R&D program: 1988-98	128
A-47.	Domestic employment of R&D-performing companies, by industry and by size of company: 1997-98	129
A-48.	R&D scientists and engineers per 1,000 employees in R&D-performing companies, by industry and by size of company: 1988-98	134
A-49.	R&D funds per employee in R&D-performing companies, by size of company: 1988-98	137
A-50.	Distribution of total employment in R&D-performing companies ranked by size of R&D program: 1988-98	138

TABLE NOTES

These notes pertain to the tables in this section and in section B except as noted in footnotes and other explanatory information noted at the end of specific tables.

COMPANY SIZE

Companies were categorized by total number of domestic employees. The following are the six size classes used in this report:

- fewer than 500 employees;
- 500 to 999 employees;
- 1,000 to 4,999 employees;
- 5,000 to 9,999 employees;
- 10,000 to 24,999 employees; and
- 25,000 or more employees.

CURRENT AND CONSTANT DOLLARS

Statistics in all tables are reported in current dollars. Constant dollars are also presented in the summary tables (A-1, A-26, A-27, and A-28). Gross domestic product (GDP) implicit price deflators were used to convert current to constant dollars.

DISCLOSURE AND SUPPRESSION OF STATISTICS

Title 13 of the United States Code prohibits publication or release of data or statistics that may reveal information about individual companies. Therefore, the data in some table cells may have been deleted and replaced with “(D).” This occurs when a small number of companies account for a large percentage of the estimate in a particular data cell. Although publication of certain cells may be withheld, the estimates in the cells are always included in totals. The tables most often affected by this rule are those that contain data on Federal support for R&D performance.

GEOGRAPHIC STATISTICS

The statistics cover only those operations located in the 50 states and the District of Columbia. Statistics on company-sponsored R&D performed outside the United States by foreign subsidiaries of U.S. domestic companies are included in table A-11 but excluded from all other tables.

IMPUTATION

Missing data were imputed for some data items. Therefore, the statistics in some table cells may be accompanied by the notation “(S),” which indicates that the imputation rate—the percentage of the statistic not reported by respondents and consequently estimated—exceeds 50 percent for that item. In such cases, the estimate may be statistically unreliable. See table B-4 for imputation rates for specific items.

INDUSTRY CLASSIFICATION

One Standard Industrial Classification (SIC) code was assigned to each company. A single SIC code was assigned to multi-establishment companies based on the code that represented the most dominant aggregated activity for that firm in terms of total payroll. Statistics for the following industry groupings are published in this report (SIC codes are shown in parentheses⁵):

- Food, kindred, and tobacco products (20, 21)
- Food and kindred products (20)
- Tobacco products (21)
- Textiles and apparel (22, 23)
- Textile mill products (22)
- Apparel (23)
- Lumber, wood products, and furniture (24, 25)
- Lumber and wood products, except furniture (24)
- Furniture and fixtures (25)
- Paper and allied products (26)
- Printing, publishing, and allied industries (27)
- Chemicals and allied products (28)
 - Industrial chemicals (281–82, 286)
 - Drugs and medicines (283)
 - Other chemicals (284–85, 287–89)
- Petroleum refining and extraction (13, 29)
- Rubber products (30)
- Leather and leather goods (31)
- Stone, clay, and glass products (32)
- Primary metals (33)
 - Ferrous metals and products (331–32, 3398–99)
 - Nonferrous metals and products (333–36)

⁵The 1987 revision of the SIC system was used for the 1998 survey.

Fabricated metal products (34)	
Machinery (35)	
Office, computing, and accounting machines (357)	
Other machinery, except electrical (351–56, 358–59)	
Electrical equipment (36)	
Radio and TV receiving equipment (365)	
Communication equipment (366)	
Electronic components (367)	
Other electrical equipment (361–64, 369)	
Transportation equipment (37)	
Motor vehicles and motor vehicles equipment (371)	
Other transportation equipment (373–75, 379)	
Aircraft and missiles (372, 376) ⁶	
Professional and scientific instruments (38)	
Scientific and mechanical measuring instruments (381–82)	
Optical, surgical, photographic, and other instruments (384–87)	
Miscellaneous manufacturing industries (39)	
Other manufacturing industries not elsewhere classified	
Transportation and utilities (40–42, 44–49)	
Communications (48)	
Telephone communications (481)	
Other communications (482–84, 489)	
Electric, gas, and sanitary services (49)	
Other transportation and utilities (40–42, 44–47)	
Trade (50–59)	
Finance, insurance, and real estate (60–65, 67)	
Services (701, 72, 73, 75–81, 83, 84, 87, 89)	
Business services (73)	
Computer and data processing services (737)	
Other business services (731–36, 738)	
Health services (80)	
Offices and clinics of medical doctors, hospitals, medical and dental labs (801, 806, 807)	
Other health services (802–5, 808–9)	
Engineering and management services (87)	
Engineering, architectural, and surveying (871)	
Research, development, and testing (873)	
Other engineering and management services (872, 874)	
Other services (701, 72, 75–79, 81, 83, 84, 89)	
Other nonmanufacturing industries—agricultural services, forestry, fishing, hunting, and mining (07–12, 14); and construction (15–17)	

PERCENTAGES

Percentages were calculated on the basis of thousands of dollars and may differ from those calculated using the rounded figures shown.

REPORTING UNIT

The basic reporting unit was the company, firm, or enterprise that included all establishments under common ownership or control. All R&D expenditures and all scientists and engineers of each company were classified into a single SIC code and size category.

ROUNDING

Because of rounding, details may not add to totals.

⁶Because of the close similarity of their R&D activities, companies primarily engaged in the manufacture of ordnance and accessories, including complete guided missiles, are grouped with companies primarily engaged in the manufacture of aircraft and parts.

Table A-1. Trends in industrial R&D performance, by source of funds, in current and in constant dollars: 1953–98

Year	Page 1 of 2					
	Total R&D		Federal		Company ¹	
	Current dollars	Constant 1992 dollars	Current dollars	Constant 1992 dollars	Current dollars	Constant 1992 dollars
[In millions of dollars]						
1953.....	3,630	17,988	1,430	7,086	2,200	10,902
1954.....	4,070	19,941	1,750	8,574	2,320	11,367
1955.....	4,640	22,372	2,180	10,511	2,460	11,861
1956.....	6,605	30,764	3,328	15,501	3,277	15,263
1957.....	7,731	34,856	4,335	19,545	3,396	15,311
1958.....	8,389	36,940	4,759	20,956	3,630	15,984
1959.....	9,618	41,908	5,635	24,553	3,983	17,355
1960.....	10,509	45,161	6,081	26,132	4,428	19,029
1961.....	10,908	46,338	6,240	26,508	4,668	19,830
1962.....	11,464	48,087	6,434	26,988	5,029	21,095
1963.....	12,630	52,363	7,270	30,141	5,360	22,222
1964.....	13,512	55,196	7,720	31,536	5,792	23,660
1965.....	14,185	56,831	7,740	31,010	6,445	25,821
1966.....	15,548	60,569	8,332	32,458	7,216	28,111
1967.....	16,385	61,854	8,365	31,578	8,020	30,276
1968.....	17,429	63,057	8,560	30,970	8,869	32,088
1969.....	18,308	63,262	8,451	29,202	9,857	34,060
1970.....	18,067	59,275	7,779	25,522	10,288	33,753
1971.....	18,320	57,143	7,666	23,911	10,654	33,231
1972.....	19,552	58,504	8,017	23,989	11,535	34,515
1973.....	21,249	60,195	8,145	23,074	13,104	37,122
1974.....	22,887	59,493	8,220	21,367	14,667	38,126
1975.....	24,187	57,465	8,605	20,444	15,582	37,021
1976.....	26,997	60,599	9,561	21,461	17,436	39,138
1977.....	29,825	62,882	10,485	22,106	19,340	40,776
1978.....	33,304	65,443	11,189	21,987	22,115	43,456
1979.....	38,226	69,212	12,518	22,665	25,708	46,547
1980.....	44,505	73,769	14,029	23,254	30,476	50,515
1981.....	51,810	78,488	16,382	24,817	35,428	53,671
1982.....	58,650	83,583	18,545	26,429	40,105	57,154
1983.....	65,268	89,213	20,680	28,267	44,588	60,946
1984.....	74,800	98,525	23,396	30,817	51,404	67,708
1985.....	84,239	107,270	27,196	34,631	57,043	72,638
1986.....	87,823	108,989	27,891	34,613	59,932	74,376
1987.....	92,155	110,950	30,752	37,024	61,403	73,926
1988 ²	97,015	112,690	30,343	35,246	66,672	77,445
1989 ²	102,055	113,748	28,554	31,826	73,501	81,923
1990 ²	109,727	117,230	28,125	30,048	81,602	87,182
1991 ^{2,3}	116,952	120,173	26,372	27,098	90,580	93,074
1992 ³	119,110	119,110	24,722	24,722	94,388	94,388
1993 ³	117,400	114,380	22,809	22,222	94,591	92,158
1994 ³	119,595	113,802	22,463	21,375	97,131	92,426

See explanatory information and SOURCE at end of table.

Table A-1. Trends in industrial R&D performance, by source of funds, in current and in constant dollars: 1953–98

Page 2 of 2

Year	Total R&D		Federal		Company ¹	
	Current dollars	Constant 1992 dollars	Current dollars	Constant 1992 dollars	Current dollars	Constant 1992 dollars
	[In millions of dollars]					
1995 ³	132,103	122,875	23,451	21,813	108,652	101,062
1996 ³	144,667	132,080	23,653	21,595	121,015	110,486
1997 ³	157,539	141,202	23,928	21,447	133,611	119,755
1998 ³	169,180	150,115	24,164	21,441	145,016	128,674

¹ The company-funded R&D in this table is the industrial R&D performed within company facilities funded from all sources except the Federal Government. The funds predominantly are the company's own, but also include funds from outside organizations such as other companies, research institutions, universities and colleges, nonprofit organizations, and State governments. Excluded from this table are company-funded R&D not performed within the company (e.g., R&D contracted out to other organizations) and company-funded R&D not performed in the U.S. (e.g., R&D not performed on U.S. soil by foreign subsidiaries or other foreign organizations).

² As a result of a new sample design, statistics for 1988–91 have been revised since originally published. These statistics now better reflect R&D performance among firms in the nonmanufacturing industries and small firms in all industries.

³ As a result of the new sample design, statistics for 1991 and later years are not directly comparable with statistics for 1990 and earlier years.

NOTE: Gross domestic product (GDP) implicit price deflators were used to convert current dollars to constant (1992) dollars.

SOURCE: National Science Foundation/Division of Science Resources Studies, Survey of Industrial Research and Development: 1998

Table A-2. Summary data for R&D-performing companies, by detailed industry and by size of company: 1997-98

Page 1 of 4

Industry and size of company	SIC code	Research and development funds						Domestic net sales	R&D scientists and engineers		Domestic employment				
		Total		Federal		Company			January ³		March				
		1997	1998	1997	1998	1997	1998		1997	1998	1997	1998			
Distribution by industry:		[In millions of dollars]										[In thousands]			
All industries.....		157,539	169,180	23,928	24,164	133,611	145,016	4,573,376	4,683,335	951.5	998.0	20,221	18,289		
Manufacturing ^{1,2}		121,025	120,401	19,823	18,189	101,202	102,211	3,084,508	3,221,047	682.1	659.0	11,700	11,672		
Food and kindred products.....	20	1,808	1,728	0	0	1,808	1,728	366,014	379,490	11.8	10.7	1,236	1,139		
Tobacco products.....	21	(D)	(D)	0	0	(D)	(D)	(D)	8,595	(D)	(D)	12	15		
Textile mill products.....	22	(D)	257	(D)	0	265	257	33,660	28,416	2.4	1.9	261	225		
Apparel.....	23	(D)	294	(D)	(D)	242	(D)	19,187	21,191	1.7	(S) 1.1	140	136		
Lumber and wood products, except furniture.....	24	60	280	0	5	60	275	11,955	15,846	(D)	2.8	78	96		
Furniture and fixtures.....	25	314	(D)	0	(D)	314	289	29,100	28,142	3.2	2.8	177	183		
Paper and allied products.....	26	(D)	(D)	(D)	(D)	1,491	1,583	135,350	153,629	(S) 11.1	(S) 12.5	554	624		
Printing, publishing, and allied industries.....	27	367	332	0	2	367	330	48,225	47,136	2.4	3.0	321	277		
Chemicals and allied products.....	28	(D)	21,930	(D)	(S) 483	18,693	21,448	353,639	338,214	91.2	93.5	1,043	966		
Petroleum refining and extraction....	13,29	(D)	1,808	(D)	6	1,651	1,802	282,965	222,246	8.0	8.0	242	303		
Rubber products.....	30	(D)	(D)	(D)	(D)	1,406	1,694	100,785	80,249	12.0	14.0	482	549		
Leather and leather products.....	31	42	26	(D)	0	(D)	26	(D)	4,080	0.2	(S) 0.2	52	21		
Stone, clay, and glass products.....	32	619	727	2	101	617	625	33,440	43,041	(S) 4.0	4.7	169	219		
Primary metals.....	33	988	(D)	221	(D)	767	722	133,940	120,942	(S) 6.4	6.1	494	470		
Fabricated metal products.....	34	1,818	1,643	129	43	1,689	1,599	110,588	112,944	13.2	13.2	686	730		
Machinery.....	35	19,250	15,172	230	81	19,020	15,091	333,668	297,651	116.6	100.3	1,423	1,280		
Electrical equipment.....	36	24,972	26,175	1,839	1,613	23,134	24,563	403,147	381,259	176.6	(S) 176	1,630	1,415		
Transportation.....	37	31,997	29,296	12,251	10,330	19,746	18,966	517,156	776,193	(S) 144.2	137.8	1,837	2,120		
Professional and scientific instruments.....	38	13,835	(D)	4,520	(D)	9,315	9,987	119,289	128,758	(S) 71.6	(S) 64.5	705	709		
Miscellaneous manufacturing industries	39	545	(D)	0	(D)	545	893	31,066	33,027	4.6	6.2	157	195		

See explanatory information and SOURCE at end of table.

Table A-2. Summary data for R&D-performing companies, by detailed industry and by size of company: 1997-98

Page 2 of 4

Industry and size of company	SIC code	Research and development funds						Domestic net sales		R&D scientists and engineers		Domestic employment	
		Total		Federal		Company				January ³	March	1998	1999
		1997	1998	1997	1998	1997	1998	1997	1998	1998	1999	1997	1998
[In millions of dollars]												[In thousands]	
Distribution by industry:													
Nonmanufacturing ²		36,514	48,780	4,105	5,975	32,409	42,805	1,488,869	1,462,288	269.5	338.7	8,521	6,617
Agricultural services.....	07-09	7	(D)	0	0	7	(D)	1,522	1,413	0.1	(D)	18	15
Mining.....	10-14	(D)	(D)	(D)	(D)	97	73	28,958	17,612	0.7	(S) 0.6	78	62
Construction.....	15-17	261	(D)	1	(D)	260	443	14,511	14,684	2.6	8.8	102	103
Railroad transportation.....	40	(D)	9	(D)	0	5	9	25,465	28,536	0.0	0.0	132	156
Local and suburban transit and interurban highway passenger transportation.....	41	0	0	0	0	0	0	0	0	0.0	0.0	0	0
Motor freight transportation and warehousing.....	42	600	(D)	0	0	600	(D)	154,511	30,461	5.2	0.5	2,073	385
Water transportation.....	44	(D)	4	0	0	(D)	4	(D)	1,755	(D)	(D)	(D)	3
Transportation by air.....	45	(D)	(S) 75	(D)	0	55	(S) 75	11,579	(S) 12,202	0.2	0.1	136	(D)
Pipelines, except natural gas.....	46	0	0	0	0	0	0	0	0	0.0	0.0	0	0
Transportation services.....	47	9	(D)	0	0	9	(D)	(D)	(D)	(D)	(D)	(S) 4	(D)
Communications.....	48	(D)	(D)	(D)	(D)	1,884	1,768	278,724	204,176	(S) 8.4	(S) 14.1	1,109	801
Electric, gas, and sanitary services.....	49	(D)	(D)	(D)	(D)	258	182	188,859	184,188	1.1	1.0	525	416
Durable goods.....	50	(D)	10,422	(D)	33	6,006	10,388	118,830	163,157	36.0	60.7	386	654
Nondurable goods.....	51	(D)	(D)	(D)	(D)	1,712	893	95,125	30,990	8.6	5.7	232	103
Building materials, hardware, garden supply and mobile home dealers.....	52	5	9	0	0	5	9	(D)	16,481	0.2	0.2	(D)	86
General merchandise stores.....	53	0	0	0	0	0	0	0	0	0.0	0.0	0	0
Food stores.....	54	66	(D)	0	0	66	(D)	30,944	33,493	0.5	(S) 0.3	203	227
Automotive dealers and gasoline service stations.....	55	0	0	0	0	0	0	0	120	0.0	0.0	0	3

See explanatory information and SOURCE at end of table.

Table A-2. Summary data for R&D-performing companies, by detailed industry and by size of company: 1997-98

Page 3 of 4

Industry and size of company	SIC code	Research and development funds						Domestic net sales		R&D scientists and engineers		Domestic employment	
		Total		Federal		Company				January ³	March		
		1997	1998	1997	1998	1997	1998	1997	1998	1998	1999	1997	1998
[In millions of dollars]										[In thousands]			
Distribution by industry:													
Apparel and accessory stores.....	56	(D)	0	0	0	(D)	0	(D)	0	0.0	0.0	(D)	0
Home furniture, furnishings and equipment stores.....	57	94	(D)	0	(D)	94	13	(D)	(D)	0.9	(S) 0.6	(D)	(D)
Eating and drinking places.....	58	139	35	0	0	139	35	58,016	51,724	0.9	0.4	651	654
Miscellaneous retail.....	59	83	(D)	0	(D)	83	611	9,806	12,971	0.9	0.8	82	85
Depository institutions.....	60	450	401	0	0	450	401	59,163	81,508	4.7	(S) 4	257	317
Nondepository credit institutions.....	61	(D)	(D)	0	0	(D)	(D)	6,914	(D)	(D)	(D)	17	(D)
Security and commodity brokers, dealers and exchanges, and services.....	62	442	699	0	0	442	699	20,713	24,977	3.0	2.6	61	60
Insurance carriers, agents, brokers and services.....	63,64	210	(D)	0	(D)	210	359	135,451	258,166	4.0	9.2	210	401
Real estate; holding and other investment offices.....	65,67	(D)	89	(D)	0	325	89	4,438	3,975	(S) 5.7	1.4	39	37
Hotels and personal services.....	701,72	16	(D)	0	(D)	16	78	11,091	8,721	0.2	0.1	178	100
Business services.....	73	12,321	16,065	400	603	11,921	15,463	109,755	148,292	113.0	139.4	1,342	1,110
Automotive and miscellaneous repair, services and parking.....	75,76	258	114	6	0	252	114	5,821	15,290	2.5	(S) 1.1	48	93
Motion pictures.....	78	99	(D)	0	0	99	(D)	(D)	(D)	1.0	(D)	53	(D)
Amusement and recreation services.....	79	57	(D)	0	0	57	(D)	903	(D)	0.5	(D)	5	(D)
Health services.....	80	(D)	1,212	(D)	33	829	1,178	13,454	13,985	6.8	4.9	113	88
Legal services.....	81	0	0	0	0	0	0	0	0	0.0	0.0	0	0
Social services.....	83	(D)	(D)	0	0	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)

See explanatory information and SOURCE at end of table.

Table A-2. Summary data for R&D-performing companies, by detailed industry and by size of company: 1997–98

Page 4 of 4

Industry and size of company	SIC code	Research and development funds						Domestic net sales		R&D scientists and engineers		Domestic employment	
		Total		Federal		Company				January ³	March	1998	1999
		1997	1998	1997	1998	1997	1998	1997	1998	1998	1999	1997	1998
[In millions of dollars]										[In thousands]			
Distribution by industry:													
Museums, art galleries, and botanical and zoological gardens.....	84	0	0	0	0	0	0	0	0	0.0	0.0	0	0
Engineering and management services.....	87	9,879	13,493	3,453	4,112	6,426	9,381	56,486	64,139	60.2	74.6	344	409
Miscellaneous services.....	89	(D)	698	(D)	663	20	36	(D)	1,463	(S) 0.2	4.9	2	11
Distribution by size of company: [Number of employees]													
Total.....		157,539	169,180	23,928	24,164	133,611	145,016	4,573,376	4,683,335	951.5	997.7	20,221	18,289
Fewer than 500.....		24,063	30,175	2,209	3,436	21,854	26,739	383,693	366,082	201.8	230.9	1,975	2,174
500 to 999.....		4,966	5,495	376	363	4,590	5,132	164,954	170,667	41.3	44.5	790	800
1,000 to 4,999.....		19,590	21,525	540	620	19,049	20,905	730,532	702,629	137.8	139.8	2,860	2,776
5,000 to 9,999.....		14,266	14,053	612	536	13,655	13,517	579,895	746,481	100.6	103.3	2,254	2,057
10,000 to 24,999.....		21,510	24,876	913	955	20,597	23,921	839,149	896,445	116.5	122.0	3,188	2,929
25,000 or more.....		73,144	73,055	19,277	18,253	53,866	54,802	1,875,152	1,801,030	(S) 353.5	356.8	9,154	7,554

¹ Data for manufacturing industries are shown separately for each two-digit SIC, with the exception of SICs 13 and 29 which are combined.

² Manufacturing companies with fewer than 50 employees and nonmanufacturing companies with fewer than 15 employees were sampled separately without regard to industry classification to minimize year-to-year variation in survey estimates. However, estimates for companies in these groups are included with their respective SIC classification for this table. For other tables, they are combined with estimates for companies in "Other manufacturing industries" and "Other nonmanufacturing industries," respectively.

³ Data recorded in January represent employment figures for the previous year.

KEY: (D) = Data have been withheld to avoid disclosing operations of individual companies.

(S) = Indicates imputation of more than 50 percent.

SOURCE: National Science Foundation/Division of Science Resources Studies, Survey of Industrial Research and Development: 1998

Table A-3. Total (company, Federal, and other) funds for industrial R&D performance, by industry and by size of company: 1988-98

Page 1 of 3

Industry and size of company	SIC code	1988 ³	1989 ³	1990 ³	1991 ^{3, 4}	1992 ⁴	1993 ⁴	1994 ⁴	1995 ⁴	1996 ⁴	1997 ⁴	1998 ⁴
[In millions of dollars]												
Distribution by industry:												
All industries.....		97,015	102,055	109,727	116,952	119,110	117,400	119,595	132,103	144,667	157,539	169,180
Manufacturing.....		86,503	88,024	88,934	88,506	90,177	86,569	90,749	100,067	111,864	121,025	120,401
Food, kindred, and tobacco products.....	20,21	(D)	(D)	(D)	1,277	1,386	1,345	1,476	1,566	1,564	1,787	1,711
Textiles and apparel.....	22,23	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)
Lumber, wood products, and furniture.....	24,25	(D)	192	216	(D)	(D)	(D)	(D)	(D)	(D)	348	374
Paper and allied products.....	26	(D)	879	1,059	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)
Chemicals and allied products.....	28	11,067	12,069	13,291	14,648	15,381	(D)	(D)	17,547	(D)	(D)	21,764
Industrial chemicals.....	281-82,286	4,172	4,451	5,010	5,390	5,165	(D)	(D)	(D)	(D)	(D)	(D)
Drugs and medicines.....	283	4,906	(D)	(D)	(D)	7,944	9,146	9,633	10,215	9,773	11,589	12,571
Other chemicals.....	284-85,287-89	1,989	(D)	(D)	(D)	2,272	(D)	(D)	(D)	2,505	(D)	(D)
Petroleum refining and extraction.....	13,29	1,997	2,180	2,306	2,498	2,277	2,152	1,950	1,760	1,654	(D)	1,808
Rubber products.....	30	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)
Stone, clay, and glass products.....	32	(D)	(D)	(D)	(D)	(D)	538	591	448	468	608	(D)
Primary metals.....	33	637	686	739	714	522	669	690	593	(D)	988	(D)
Ferrous metals and products.....	331-32,3398-99	253	(D)	(D)	(D)	(D)	289	(D)	(D)	(D)	(D)	(D)
Nonferrous metals and products.....	333-36	384	(D)	(D)	(D)	(D)	380	(D)	(D)	(D)	(D)	(D)
Fabricated metal products.....	34	881	904	939	974	1,017	1,158	1,111	1,023	(D)	1,798	1,595
Machinery.....	35	(D)	(D)	14,446	14,775	14,938	8,381	8,110	(D)	13,455	18,499	14,919
Office, computing, and accounting machines.....	357	(D)	(D)	(D)	(D)	(D)	4,950	4,106	(D)	(D)	12,840	8,905
Other machinery, except electrical.....	351-56,358-59	2,682	2,729	(D)	(D)	(D)	3,431	4,004	5,041	(D)	5,659	6,014
Electrical equipment.....	36	14,128	13,318	13,400	13,415	13,360	13,349	15,338	18,751	22,498	24,585	25,990
Radio and TV receiving equipment.....	365	149	96	114	(D)	(D)	(D)	(D)	(D)	(D)	(D)	155
Communication equipment.....	366	8,427	7,071	5,928	4,787	(D)						
Electronic components.....	367	4,133	4,025	3,914	(D)	3,567	5,311	6,032	(D)	(D)	(D)	(D)
Other electrical equipment.....	361-64,369	1,419	2,126	3,444	(D)	(D)	(D)	(D)	(D)	(D)	4,909	4,811

See explanatory information and SOURCE at end of table.

Table A-3. Total (company, Federal, and other) funds for industrial R&D performance, by industry and by size of company: 1988-98

Page 2 of 3

Industry and size of company	SIC code	1988 ³	1989 ³	1990 ³	1991 ^{3, 4}	1992 ⁴	1993 ⁴	1994 ⁴	1995 ⁴	1996 ⁴	1997 ⁴	1998 ⁴
[In millions of dollars]												
Distribution by industry:												
Transportation equipment.....	37	34,775	33,859	31,361	27,428	27,494	27,258	28,087	32,441	32,737	31,993	29,279
Motor vehicles and motor vehicles equipment.....	371	(D)	(D)	(D)	(D)	(D)	11,718	(D)	(D)	(D)	(D)	(D)
Other transportation equipment.....	373-75,379	(D)	(D)	(D)	(D)	(D)	483	(D)	(D)	(D)	(D)	(D)
Aircraft and missiles.....	372,376	24,168	22,331	20,635	16,629	17,158	15,056	14,260	16,951	16,224	16,296	14,449
Professional and scientific instruments.....	38	5,530	5,992	7,055	8,705	9,542	10,119	11,441	11,976	12,149	13,458	(D)
Scientific and mechanical measuring instruments.....	381-82	1,959	2,366	3,346	(D)	5,156	5,681	6,952	7,146	(D)	8,135	(D)
Optical, surgical, photographic, and other instruments.....	384-87	3,571	3,626	3,709	(D)	4,386	4,438	4,489	4,831	(D)	5,323	6,085
Other manufacturing industries ¹	27,31,39	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	2,798	2,795
Nonmanufacturing ²		10,513	14,031	20,793	28,446	28,933	30,831	28,846	32,036	32,803	36,514	48,780
Transportation and utilities.....	40-42,44-49	NA	NA	NA	NA	NA	NA	NA	5,435	4,678	3,013	(D)
Communications.....	48	NA	NA	NA	NA	NA	NA	NA	(D)	(D)	(D)	(D)
Telephone communications.....	481	NA	NA	NA	NA	NA	NA	NA	(D)	(D)	(D)	(D)
Other communications.....	482-484,489	NA	NA	NA	NA	NA	NA	NA	59	73	58	(D)
Electric, gas, and sanitary services.....	49	NA	NA	NA	NA	NA	NA	NA	440	352	(D)	(D)
Other transportation and utilities.....	40-42,44-47	NA	NA	NA	NA	NA	NA	NA	(D)	(D)	(D)	(D)
Trade.....	50-59	NA	NA	NA	NA	NA	NA	NA	(D)	6,389	(D)	11,336
Finance, insurance, and real estate.....	60-65,67	NA	NA	NA	NA	NA	NA	NA	(D)	(D)	(D)	(D)
Services.....	701,72,73,75-81,83,84,87,89	NA	NA	NA	NA	NA	NA	NA	17,876	19,022	22,400	29,281
Business services.....	73	NA	NA	NA	NA	NA	NA	NA	9,293	10,641	11,960	15,222
Computer and data processing services.....	737	NA	NA	NA	NA	NA	NA	NA	9,059	(D)	11,706	(D)
Other business services.....	731-736,738	NA	NA	NA	NA	NA	NA	NA	234	(D)	254	(D)
Health services.....	80	NA	NA	NA	NA	NA	NA	NA	756	(D)	(D)	1,207
Offices and clinics of medical doctors, hospitals, medical, and dental labs.....	801,806,807	NA	NA	NA	NA	NA	NA	NA	(D)	(S) 715	(D)	1,096
Other health services.....	802-805,808-809	NA	NA	NA	NA	NA	NA	NA	(D)	(D)	49	111

See explanatory information and SOURCE at end of table.

Table A-3. Total (company, Federal, and other) funds for industrial R&D performance, by industry and by size of company: 1988-98

Page 3 of 3

Industry and size of company	SIC code	1988 ³	1989 ³	1990 ³	1991 ^{3, 4}	1992 ⁴	1993 ⁴	1994 ⁴	1995 ⁴	1996 ⁴	1997 ⁴	1998 ⁴
[In millions of dollars]												
Distribution by industry:												
Engineering and management services	87	NA	NA	NA	NA	NA	NA	NA	7,662	7,318	9,290	11,835
Engineering, architectural, and surveying	871	NA	NA	NA	NA	NA	NA	NA	2,933	1,660	2,039	2,025
Research, development, and testing	873	NA	NA	NA	NA	NA	NA	NA	(D)	5,484	(D)	9,169
Other engineering and management services	872, 874	NA	NA	NA	NA	NA	NA	NA	(D)	173	(D)	641
Other services	701, 72, 75-79, 81, 83, 84, 89	NA	NA	NA	NA	NA	NA	NA	165	(D)	(D)	1,017
Other nonmanufacturing industries ¹	07-12, 14, 15, 161-162, 17	NA	NA	NA	NA	NA	NA	NA	413	(D)	1,618	3,830
Distribution by size of company: [Number of employees]												
Total		97,015	102,055	109,727	116,952	119,110	117,400	119,595	132,103	144,667	157,539	169,180
Fewer than 500		(S)	7,809	(S)	13,172	13,557	14,620	13,966	16,662	20,249	24,063	30,175
500 to 999		1,669	1,825	2,154	8,000	7,958	3,230	3,608	4,693	4,637	4,966	5,495
1,000 to 4,999		7,622	7,881	8,411	10,453	11,886	13,334	14,617	16,960	18,273	19,590	21,525
5,000 to 9,999		5,245	5,756	6,746	8,049	8,258	9,135	8,912	9,532	11,537	14,266	14,053
10,000 to 24,999		11,506	10,450	12,486	15,770	15,744	15,421	15,972	17,071	20,164	21,510	24,876
25,000 or more		63,694	68,335	71,030	61,508	61,707	61,659	62,519	67,185	69,808	73,144	73,055

¹ Beginning in 1996 manufacturing companies with fewer than 50 employees and nonmanufacturing companies with fewer than 15 employees were sampled separately without regard to industry classification to minimize year-to-year variation in survey estimates. Estimates for manufacturing companies in this group are combined with those for companies in "Other manufacturing industries." Estimates for nonmanufacturing companies in this group are combined with those for companies in "Other nonmanufacturing industries." As a result, statistics for "Other manufacturing industries" and for "Other nonmanufacturing industries" after 1995 are not comparable with statistics for prior years.

² Until 1995, data were not broken down below this level of detail for most nonmanufacturing industries.

³ As a result of a new sample design, statistics for 1988-91 have been revised since originally published. These statistics now better reflect R&D performance among firms in the nonmanufacturing industries and small firms in all industries.

⁴ As a result of the new sample design, statistics for 1991 and later years are not directly comparable with statistics for 1990 and earlier years. See the technical notes for more information.

KEY: (D) = Data have been withheld to avoid disclosing operations of individual companies.

(S) = Indicates imputation of more than 50 percent. For years prior to 1993, data have been withheld.

NA = Not available.

SOURCE: National Science Foundation/Division of Science Resources Studies, Survey of Industrial Research and Development: 1998

Table A-4. Total (company, Federal, and other) funds for industrial R&D performance, by industry and by size of company: 1998

Page 1 of 3

Industry	SIC code	Total	Size of company					
			Fewer than 500 employees	500 to 999 employees	1,000 to 4,999 employees	5,000 to 9,999 employees	10,000 to 24,999 employees	25,000 or more employees
[In millions of dollars]								
All industries.....		169,180	30,175	5,495	21,525	14,053	24,876	73,055
Manufacturing.....		120,401	9,404	2,916	15,636	11,398	(D)	(D)
Food, kindred, and tobacco products.....	20,21	1,711	59	49	229	412	240	722
Textiles and apparel.....	22,23	(D)	(D)	(D)	(D)	(D)	(D)	(D)
Lumber, wood products, and furniture.....	24,25	374	46	(D)	(D)	125	72	0
Paper and allied products.....	26	(D)	149	51	135	98	347	(D)
Chemicals and allied products.....	28	21,764	2,118	290	4,304	2,737	(D)	(D)
Industrial chemicals.....	281-82,286	(D)	1,670	194	(D)	834	(D)	(D)
Drugs and medicines.....	283	12,571	(D)	46	(D)	1,424	4,869	3,275
Other chemicals.....	284-85,287-89	(D)	(D)	50	(D)	479	(D)	(D)
Petroleum refining and extraction.....	13,29	1,808	32	7	75	(D)	768	(D)
Rubber products.....	30	(D)	230	101	411	(D)	264	(D)
Stone, clay, and glass products.....	32	(D)	12	12	(D)	98	(D)	0
Primary metals.....	33	(D)	(D)	(D)	150	(D)	(D)	(D)
Ferrous metals and products.....	331-32,3398-99	(D)	45	2	56	(D)	(D)	(D)
Nonferrous metals and products.....	333-36	(D)	(D)	(D)	94	(D)	(D)	(D)
Fabricated metal products.....	34	1,595	246	(D)	(D)	(D)	369	(D)
Machinery.....	35	14,919	1,276	594	(D)	1,497	4,528	(D)
Office, computing, and accounting machines.....	357	8,905	426	222	(D)	(D)	2,678	(D)
Other machinery, except electrical.....	351-56,358-59	6,014	850	372	(D)	(D)	1,849	(D)
Electrical equipment.....	36	25,990	1,735	896	3,931	(D)	(D)	14,234
Radio and TV receiving equipment.....	365	155	24	(D)	121	0	0	(D)
Communication equipment.....	366	(D)	(D)	290	(D)	(D)	0	(D)
Electronic components.....	367	(D)	(D)	(D)	2,209	(D)	(D)	(D)
Other electrical equipment.....	361-64,369	4,811	438	(D)	(D)	(D)	520	(D)

See explanatory information and SOURCE at end of table.

Table A-4. Total (company, Federal, and other) funds for industrial R&D performance, by industry and by size of company: 1998

Page 2 of 3

Industry	SIC code	Total	Size of company					
			Fewer than 500 employees	500 to 999 employees	1,000 to 4,999 employees	5,000 to 9,999 employees	10,000 to 24,999 employees	25,000 or more employees
[In millions of dollars]								
Transportation equipment.....	37	29,279	(D)	(D)	(D)	(D)	(D)	26,834
Motor vehicles and motor vehicles equipment.....	371	(D)	115	(D)	(D)	(D)	615	(D)
Other transportation equipment.....	373-75,379	(D)	89	(D)	47	(D)	0	(D)
Aircraft and missiles.....	372,376	14,449	(D)	(D)	(D)	(D)	(D)	13,701
Professional and scientific instruments.....	38	(D)	1,158	669	(D)	1,476	(D)	(D)
Scientific and mechanical measuring instruments.....	381-82	(D)	(D)	(D)	(D)	(D)	(D)	(D)
Optical, surgical, photographic, and other instruments.....	384-87	6,085	(D)	(D)	(D)	(D)	(D)	(D)
Other manufacturing industries ¹	27,31,39	2,795	2,005	(D)	212	(D)	140	77
Nonmanufacturing.....		48,780	20,771	2,580	(S) 5889	2,654	(D)	(D)
Transportation and utilities.....	40-42,44-49	(D)	68	(D)	(D)	(D)	127	(D)
Communications.....	48	(D)	49	(D)	(D)	0	(D)	(D)
Telephone communications.....	481	(D)	32	0	0	0	(D)	(D)
Other communications.....	482-484,489	(D)	18	(D)	(D)	0	0	(D)
Electric, gas, and sanitary services.....	49	(D)	4	(D)	59	(D)	76	(D)
Other transportation and utilities.....	40-42,44-47	(D)	15	3	(D)	(D)	(D)	(D)
Trade.....	50-59	11,336	(D)	(D)	1,241	1,054	(D)	(D)
Finance, insurance, and real estate.....	60-65,67	(D)	132	27	289	253	(D)	(D)
Services.....	701,72,73,75- 81,83,84,87,89	29,281	14,641	2,235	4,064	(D)	(D)	(D)
Business services.....	73	15,222	5,068	(D)	3,340	(D)	(D)	(D)
Computer and data processing services.....	737	(D)	(D)	(D)	3,281	(D)	(D)	(D)
Other business services.....	731-736,738	(D)	(D)	(D)	59	(D)	(D)	36

See explanatory information and SOURCE at end of table.

Table A-4. Total (company, Federal, and other) funds for industrial R&D performance, by industry and by size of company: 1998

Page 3 of 3

Industry	SIC code	Total	Size of company					
			Fewer than 500 employees	500 to 999 employees	1,000 to 4,999 employees	5,000 to 9,999 employees	10,000 to 24,999 employees	25,000 or more employees
[In millions of dollars]								
Health services.....		80	1,207	(D)	(D)	(D)	(D)	0
Offices and clinics of medical doctors, hospitals, medical, and dental labs.....	801,806,807	1,096	(D)	(D)	(D)	0	(D)	0
Other health services.....	802-805,808-809	111	78	0	(D)	(D)	0	0
Engineering and management services.....		87	11,835	8,185	1,082	(D)	(D)	(D)
Engineering, architectural, and surveying.....	871	2,025	1,047	(D)	(D)	(D)	(D)	(D)
Research, development, and testing.....	873	9,169	6,767	(D)	(D)	0	0	(D)
Other engineering and management services.....	872,874	641	371	161	(D)	(D)	(D)	6
Other services.....	701,72,75-79,81, 83,84,89	1,017	(D)	(D)	(D)	(D)	(D)	(D)
Other nonmanufacturing industries ¹	07-12,14,15, 161-162,17	3,830	(D)	7	(D)	(D)	(D)	(D)

¹ Manufacturing companies with fewer than 50 employees and nonmanufacturing companies with fewer than 15 employees were sampled separately without regard to industry classification to minimize year-to-year variation in survey estimates. Estimates for manufacturing companies in this group are combined with those for companies in "Other manufacturing industries." Estimates for nonmanufacturing companies in this group are combined with those for companies in "Other nonmanufacturing industries."

KEY: (D) = Data have been withheld to avoid disclosing operations of individual companies.

(S) = Indicates imputation of more than 50 percent.

SOURCE: National Science Foundation/Division of Science Resources Studies, Survey of Industrial Research and Development: 1998

**Table A-5. Total (company, Federal, and other) funds for industrial R&D performance,
by industry, by size of company, and by size of total R&D program: 1998**

Page 1 of 3

Industry and size of company	SIC code	Total	Size of total R&D program				
			Less than \$200,000	\$200,000 to \$999,999	\$ 1 million to \$9.9 million	\$ 10 million to \$99.9 million	\$100 million or more
[In millions of dollars]							
Distribution by industry:							
All industries.....		169,180	1,408	4,586	17,334	33,110	112,742
Manufacturing.....		120,401	769	1,954	6,990	19,059	91,628
Food, kindred, and tobacco products.....	20,21	1,711	10	54	218	857	571
Textiles and apparel.....	22,23	(D)	1	27	129	(S) 212	(D)
Lumber, wood products, and furniture.....	24,25	374	14	22	91	247	0
Paper and allied products.....	26	(D)	9	(D)	266	494	(D)
Chemicals and allied products.....	28	21,764	16	131	405	4,566	16,646
Industrial chemicals.....	281-82,286	(D)	(D)	0	188	2,801	3,925
Drugs and medicines.....	283	12,571	0	69	38	960	11,504
Other chemicals.....	284-85,287-89	(D)	(D)	62	179	805	1,217
Petroleum refining and extraction.....	13,29	1,808	3	29	49	284	1,443
Rubber products.....	30	(D)	(D)	162	309	652	668
Stone, clay, and glass products.....	32	(D)	10	(D)	45	239	(D)
Primary metals.....	33	(D)	3	13	211	323	(D)
Ferrous metals and products.....	331-32,3398-99	(D)	2	11	129	193	(D)
Nonferrous metals and products.....	333-36	(D)	1	1	82	130	(D)
Fabricated metal products.....	34	1,595	(D)	140	343	530	(D)
Machinery.....	35	14,919	64	232	1,289	2,513	10,821
Office, computing, and accounting machines.....	357	8,905	0	4	253	874	7,774
Other machinery, except electrical.....	351-56,358-59	6,014	64	228	1,036	1,639	3,047
Electrical equipment.....	36	25,990	19	139	1,529	3,548	20,755
Radio and TV receiving equipment.....	365	155	0	3	31	121	0
Communication equipment.....	366	(D)	(D)	0	174	1,151	9,846
Electronic components.....	367	(D)	(D)	111	777	1,464	7,493
Other electrical equipment.....	361-64,369	4,811	11	26	546	812	3,416

See explanatory information and SOURCE at end of table.

**Table A-5. Total (company, Federal, and other) funds for industrial R&D performance,
by industry, by size of company, and by size of total R&D program: 1998**

Page 2 of 3

Industry and size of company	SIC code	Total	Size of total R&D program				
			Less than \$200,000	\$200,000 to \$999,999	\$ 1 million to \$9.9 million	\$ 10 million to \$99.9 million	\$100 million or more
[In millions of dollars]							
Distribution by industry:							
Transportation equipment.....	37	29,279	4	31	522	1,245	27,476
Motor vehicles and motor vehicles equipment.....	371	(D)	3	0	406	833	(D)
Other transportation equipment.....	373-75,379	(D)	1	31	82	98	(D)
Aircraft and missiles.....	372,376	14,449	0	0	34	314	14,101
Professional and scientific instruments.....	38	(D)	(D)	88	823	2,892	10,836
Scientific and mechanical measuring instruments.....	381-82	(D)	(D)	52	437	1,391	6,679
Optical, surgical, photographic, and other instruments.....	384-87	6,085	5	36	386	1,501	4,157
		27,31,39	2,795	(D)	864	761	457
Nonmanufacturing.....		48,780	639	2,632	10,343	14,051	21,115
Transportation and utilities.....	40-42,44-49	(D)	(D)	63	169	487	1,978
Communications.....	48	(D)	(D)	36	(D)	335	1,839
Telephone communications.....	481	(D)	(D)	19	0	(D)	(D)
Other communications.....	482-484,489	(D)	0	18	(D)	(D)	(D)
Electric, gas, and sanitary services.....	49	(D)	2	9	125	70	(D)
Other transportation and utilities.....	40-42,44-47	(D)	2	17	(D)	(S) 82	(D)
Trade.....	50-59	11,336	128	458	1,779	1,365	7,606
Finance, insurance, and real estate.....	60-65,67	(D)	(D)	31	299	(D)	(D)
Services.....	701,72,73,75-81, 83,84,87,89	29,281	147	905	6,261	11,617	10,351
Business services.....	73	15,222	85	645	3,393	4,154	6,946
Computer and data processing services.....	737	(D)	(D)	575	3,236	3,989	6,946
Other business services.....	731-736,738	(D)	(D)	70	157	(S) 165	0
Health services.....	80	1,207	(D)	42	37	591	(D)
Offices and clinics of medical doctors, hospitals, medical and dental labs.....	801,806,807	1,096	(D)	34	12	517	(D)
Other health services.....	802-805,808-809	111	4	8	25	74	0

See explanatory information and SOURCE at end of table.

**Table A-5. Total (company, Federal, and other) funds for industrial R&D performance,
by industry, by size of company, and by size of total R&D program: 1998**

Page 3 of 3

Industry and size of company	SIC code	Total	Size of total R&D program				
			Less than \$200,000	\$200,000 to \$999,999	\$1 million to \$9.9 million	\$10 million to \$99.9 million	\$100 million or more
[In millions of dollars]							
Distribution by industry:							
Engineering and management services.....	87	11,835	(D)	191	2,724	6,008	(D)
Engineering, architectural, and surveying.....	871	2,025	(D)	74	511	833	(D)
Research, development, and testing.....	873	9,169	2	85	1,919	4,983	2,180
Other engineering and management services.....	872,874	641	(D)	33	294	192	(D)
Other services.....	701,72,75-79,81, 83,84,89	1,017	18	27	107	865	0
Other nonmanufacturing industries ¹	07-12,14,15, 161-162,17	3,830	344	1,174	1,835	(D)	(D)
Distribution by size of company: [Number of employees]							
Total.....		169,180	1,408	4,586	17,334	33,110	112,742
Fewer than 500.....		30,173	(D)	4,307	13,102	11,274	(D)
500 to 999.....		5,495	22	173	1,329	3,461	510
1,000 to 4,999.....		21,525	12	92	2,253	9,411	9,757
5,000 to 9,999.....		14,053	1	10	365	4,431	9,246
10,000 to 24,999.....		24,876	(D)	2	195	2,871	(D)
25,000 or more.....		73,055	1	2	90	1,662	71,300

¹ Manufacturing companies with fewer than 50 employees and nonmanufacturing companies with fewer than 15 employees were sampled separately without regard to industry classification to minimize year-to-year variation in survey estimates. Estimates for manufacturing companies in this group are combined with those for companies in "Other manufacturing industries." Estimates for nonmanufacturing companies in this group are combined with those for companies in "Other nonmanufacturing industries."

KEY: (D) = Data have been withheld to avoid disclosing operations of individual companies.

(S) = Indicates imputation of more than 50 percent.

SOURCE: National Science Foundation/Division of Science Resources Studies, Survey of Industrial Research and Development: 1998

Table A-6. Number of R&D-performing companies, by industry, by size of company, and by size of total R&D program: 1998

Page 1 of 3

Industry	SIC code	Total	Size of total R&D program				
			Less than \$200,000	\$200,000 to \$999,999	\$1 million to \$9.9 million	\$10 million to \$99.9 million	\$100 million or more
[Number of companies]							
Distribution by industry:							
All industries.....		41,923	23,903	10,622	5,908	1,283	207
Manufacturing.....		20,808	12,896	4,652	2,418	688	154
Food, kindred, and tobacco products.....	20,21	490	244	138	76	29	3
Textiles and apparel.....	22,23	138	12	70	45	9	1
Lumber, wood products, and furniture.....	24,25	271	179	45	34	13	0
Paper and allied products.....	26	285	105	58	103	17	2
Chemicals and allied products.....	28	706	175	247	111	139	35
Industrial chemicals.....	281–82,286	149	0	0	53	85	11
Drugs and medicines.....	283	151	0	97	5	29	20
Other chemicals.....	284–85,287–89	406	175	149	53	25	4
Petroleum refining and extraction.....	13,29	126	49	49	11	10	6
Rubber products.....	30	768	273	363	104	25	3
Stone, clay, and glass products.....	32	232	204	1	17	9	2
Primary metals.....	33	158	48	19	73	16	2
Ferrous metals and products.....	331–32,3398–99	107	34	15	48	9	1
Nonferrous metals and products.....	333–36	51	14	4	25	7	1
Fabricated metal products.....	34	1,136	634	359	125	16	2
Machinery.....	35	1,883	695	553	505	103	28
Office, computing, and accounting machines.....	357	136	0	8	80	34	15
Other machinery, except electrical.....	351–56,358–59	1,747	695	545	425	69	13
Electrical equipment.....	36	1,124	287	271	399	133	35
Radio and TV receiving equipment.....	365	15	0	3	9	3	0
Communication equipment.....	366	103	0	0	52	41	10
Electronic components.....	367	600	120	196	209	57	18
Other electrical equipment.....	361–64,369	406	167	72	129	32	7

See explanatory information and SOURCE at end of table.

Table A-6. Number of R&D-performing companies, by industry, by size of company, and by size of total R&D program: 1998

Page 2 of 3

Industry	SIC code	Total	Size of total R&D program				
			Less than \$200,000	\$200,000 to \$999,999	\$1 million to \$9.9 million	\$10 million to \$99.9 million	\$100 million or more
[Number of companies]							
Distribution by industry:							
Transportation equipment.....	37	542	143	98	249	35	17
Motor vehicles and motor vehicles equipment.....	371	316	94	0	193	22	6
Other transportation equipment.....	373-75,379	203	49	98	52	3	2
Aircraft and missiles.....	372,376	23	0	0	4	10	9
Professional and scientific instruments.....	38	655	103	191	228	116	17
Scientific and mechanical measuring instruments.....	381-82	355	35	112	142	60	7
Optical, surgical, photographic, and other instruments.....	384-87	299	69	78	86	56	10
Other manufacturing industries ¹	27,31,39	12,295	9,745	2,192	339	18	1
Nonmanufacturing.....		21,115	11,008	5,970	3,490	594	53
Transportation and utilities.....	40-42,44-49	324	123	143	38	14	6
Communications.....	48	113	0	99	2	7	5
Telephone communications.....	481	60	0	50	0	6	4
Other communications.....	482-484,489	53	0	49	2	1	1
Electric, gas, and sanitary services.....	49	110	62	18	27	4	0
Other transportation and utilities.....	40-42,44-47	101	62	26	9	3	1
Trade.....	50-59	3,752	2,314	931	449	43	14
Finance, insurance, and real estate.....	60-65,67	392	169	110	98	12	4
Services.....	701,72,73,75-81, 83,84,87,89	6,170	1,843	1,900	1,880	518	28
Business services.....	73	3,448	843	1,286	1,143	157	20
Computer and data processing services.....	737	3,069	638	1,181	1,078	152	20
Other business services.....	731-736,738	380	204	105	65	5	0
Health services.....	80	482	279	133	16	54	1
Offices and clinics of medical doctors, hospitals, medical, and dental labs.....	801,806,807	365	200	110	4	50	1
Other health services.....	802-805,808-809	118	80	23	12	4	0

See explanatory information and SOURCE at end of table.

Table A-6. Number of R&D-performing companies, by industry, by size of company, and by size of total R&D program: 1998

Page 3 of 3

Industry	SIC code	Total	Size of total R&D program				
			Less than \$200,000	\$200,000 to \$999,999	\$1 million to \$9.9 million	\$10 million to \$99.9 million	\$100 million or more
[Number of companies]							
Distribution by industry:							
Engineering and management services.....	87	1,776	431	390	695	253	7
Engineering, architectural, and surveying.....	871	491	172	152	136	29	2
Research, development, and testing.....	873	940	99	152	470	216	4
Other engineering and management services.....	872,874	345	160	86	89	8	1
Other services.....	701,72,75–79,81, 83,84,89	464	290	91	27	55	0
	07–12,14,15, 161–162,17	10,477	6,558	2,886	1,025	7	1
Distribution by size of company: [Number of employees]							
Total.....		41,923	23,903	10,622	5,908	1,283	207
Fewer than 500.....		38,921	23,433	10,119	4,790	577	1
500 to 999.....		1,158	294	315	414	132	3
1,000 to 4,999.....		1,244	142	164	570	316	53
5,000 to 9,999.....		288	18	16	75	139	40
10,000 to 24,999.....		183	3	5	42	79	54
25,000 or more.....		128	13	3	17	39	56

¹ Manufacturing companies with fewer than 50 employees and nonmanufacturing companies with fewer than 15 employees were sampled separately without regard to industry classification to minimize year-to-year variation in survey estimates. Estimates for manufacturing companies in this group are combined with those for companies in "Other manufacturing industries." Estimates for nonmanufacturing companies in this group are combined with those for companies in "Other nonmanufacturing industries."

SOURCE: National Science Foundation/Division of Science Resources Studies, Survey of Industrial Research and Development: 1998

Table A-7. Company and other (except Federal) funds for industrial R&D performance, by industry and by size of company: 1988-98

Page 1 of 3

Industry and size of company	SIC code	1988 ³	1989 ³	1990 ³	1991 ^{3,4}	1992 ⁴	1993 ⁴	1994 ⁴	1995 ⁴	1996 ⁴	1997 ⁴	1998 ⁴
[In millions of dollars]												
Distribution by industry:												
All industries.....		66,672	73,501	81,602	90,580	94,388	94,591	97,131	108,652	121,015	133,611	145,016
Manufacturing.....		59,415	63,199	65,251	67,639	71,025	69,901	73,375	81,236	91,845	101,202	102,211
Food, kindred, and tobacco products.....	20,21	1,173	1,244	1,248	1,277	1,386	1,345	1,476	1,566	1,564	1,787	1,711
Textiles and apparel.....	22,23	215	(S)	260	236	261	286	316	381	414	476	543
Lumber, wood products, and furniture.....	24,25	165	192	216	200	234	196	201	229	634	348	359
Paper and allied products.....	26	752	879	1,059	1,174	1,182	1,191	1,263	1,404	1,534	1,456	1,583
Chemicals and allied products.....	28	10,828	11,943	13,168	14,439	15,091	16,658	16,559	17,337	17,520	18,628	21,282
Industrial chemicals.....	281-82,286	3,939	4,340	4,902	5,225	4,911	5,165	4,780	5,139	5,246	4,970	6,467
Drugs and medicines.....	283	4,900	5,512	5,917	6,947	7,934	9,132	9,625	10,202	9,769	11,586	12,566
Other chemicals.....	284-85,287-89	1,989	2,091	2,349	2,267	2,246	2,361	2,154	1,996	2,505	2,072	2,249
Petroleum refining and extraction.....	13,29	1,975	2,162	2,289	2,487	2,268	2,138	1,939	1,754	1,630	1,612	1,802
Rubber products.....	30	718	867	1,056	(D)	1,256	1,059	1,432	1,210	1,269	1,372	1,607
Stone, clay, and glass products.....	32	697	615	538	455	479	529	553	441	463	606	592
Primary metals.....	33	620	666	717	706	514	646	672	580	637	767	720
Ferrous metals and products.....	331-32,3398-99	252	244	231	225	221	272	241	217	214	414	405
Nonferrous metals and products.....	333-36	368	422	486	481	293	374	431	363	422	353	315
Fabricated metal products.....	34	718	726	736	748	723	936	868	937	1,322	1,669	1,551
Machinery.....	35	11,929	13,342	13,575	13,720	13,903	8,295	8,011	9,676	13,338	18,393	14,846
Office, computing, and accounting machines.....	357	9,347	10,725	10,988	10,419	10,614	4,917	4,078	4,699	8,132	12,787	8,890
Other machinery, except electrical.....	351-56,358-59	2,582	2,618	2,587	3,301	3,289	3,378	3,933	4,976	5,206	5,606	5,956
Electrical equipment.....	36	9,975	9,575	9,267	8,865	9,516	11,682	13,537	17,060	20,356	22,747	24,378
Radio and TV receiving equipment.....	365	149	96	114	(D)	93	87	64	114	140	152	155
Communication equipment.....	366	4,798	4,159	3,584	(S)	3,381	3,954	4,939	3,845	4,359	7,377	10,173
Electronic components.....	367	3,684	3,655	3,496	3,177	3,320	5,105	5,870	9,628	12,497	10,786	9,776
Other electrical equipment.....	361-64,369	1,345	1,664	2,073	(D)	2,722	2,537	2,664	3,473	3,360	4,432	4,273
Transportation equipment.....	37	13,910	14,596	14,264	14,858	16,292	16,640	17,695	19,311	20,535	19,742	18,948
Motor vehicles and motor vehicles equipment.....	371	7,783	8,756	8,594	9,063	9,132	10,659	11,950	13,590	14,528	13,758	13,502
Other transportation equipment.....	373-75,379	361	337	283	262	289	297	279	232	298	307	339
Aircraft and missiles.....	372,376	5,766	5,503	5,387	5,533	6,871	5,684	5,466	5,489	5,710	5,677	5,108

See explanatory information and SOURCE at end of table.

Table A-7. Company and other (except Federal) funds for industrial R&D performance, by industry and by size of company: 1988–98

Page 2 of 3

Industry and size of company	SIC code	1988 ³	1989 ³	1990 ³	1991 ^{3,4}	1992 ⁴	1993 ⁴	1994 ⁴	1995 ⁴	1996 ⁴	1997 ⁴	1998 ⁴
[In millions of dollars]												
Distribution by industry:												
Professional and scientific instruments.....	38	5,339	5,729	6,318	6,840	7,321	7,542	8,058	8,516	8,207	8,958	9,625
Scientific and mechanical measuring instruments.....	381-82	1,863	2,205	2,696	3,017	3,013	3,196	3,687	3,787	3,283	3,719	3,614
Optical, surgical, photographic, and other instruments.....	384-87	3,476	3,524	3,621	3,823	4,308	4,346	4,371	4,729	4,924	5,240	6,011
Other manufacturing industries ¹	27,31,39	401	438	541	(D)	599	758	796	835	2,423	2,642	2,664
Nonmanufacturing ²		7,257	10,302	16,351	22,941	23,363	24,690	23,756	27,415	29,170	32,409	42,805
Transportation and utilities.....	40-42,44-49	NA	NA	NA	NA	NA	NA	NA	5,183	4,492	2,812	2,219
Communications.....	48	NA	NA	NA	NA	NA	NA	NA	4,756	3,970	1,884	1,768
Telephone communications.....	481	NA	NA	NA	NA	NA	NA	NA	4,697	3,897	1,826	1,665
Other communications.....	482-484,489	NA	NA	NA	NA	NA	NA	NA	59	73	58	103
Electric, gas, and sanitary services.....	49	NA	NA	NA	NA	NA	NA	NA	347	311	258	182
Other transportation and utilities.....	40-42,44-47	NA	NA	NA	NA	NA	NA	NA	80	211	670	269
Trade.....	50-59	NA	NA	NA	NA	NA	NA	NA	7,514	6,338	7,961	11,273
Finance, insurance, and real estate.....	60-65,67	NA	NA	NA	NA	NA	NA	NA	710	1,280	1,500	1,623
Services.....	701,72,73,75-81, 83,84,87,89	NA	NA	NA	NA	NA	NA	NA	13,606	15,904	18,594	24,392
Business services.....	73	NA	NA	NA	NA	NA	NA	NA	8,681	10,280	11,560	14,682
Computer and data processing services.....	737	NA	NA	NA	NA	NA	NA	NA	8,545	10,025	11,318	14,297
Other business services.....	731-736,738	NA	NA	NA	NA	NA	NA	NA	136	255	242	385
Health services.....	80	NA	NA	NA	NA	NA	NA	NA	753	735	679	1,173
Offices and clinics of medical doctors, hospitals, medical and dental labs.....	801,806,807	NA	NA	NA	NA	NA	NA	NA	737	713	632	1,074
Other health services.....	802-805,808-809	NA	NA	NA	NA	NA	NA	NA	16	23	48	99
Engineering and management services....	87	NA	NA	NA	NA	NA	NA	NA	4,011	4,572	5,909	8,182
Engineering, architectural, and surveying.....	871	NA	NA	NA	NA	NA	NA	NA	1,050	667	781	835
Research, development, and testing...	873	NA	NA	NA	NA	NA	NA	NA	2,829	3,776	4,782	6,780
Other engineering and management services.....	872, 874	NA	NA	NA	NA	NA	NA	NA	132	129	347	567

See explanatory information and SOURCE at end of table.

Table A-7. Company and other (except Federal) funds for industrial R&D performance, by industry and by size of company: 1988–98

Page 3 of 3

Industry and size of company	SIC code	1988 ³	1989 ³	1990 ³	1991 ^{3,4}	1992 ⁴	1993 ⁴	1994 ⁴	1995 ⁴	1996 ⁴	1997 ⁴	1998 ⁴
[In millions of dollars]												
Distribution by industry:												
Other services.....	701,72,75–79,81, 83,84,89	NA	NA	NA	NA	NA	NA	NA	160	317	446	354
[Number of employees]												
Distribution by size of company:												
Total.....		66,672	73,501	81,602	90,580	94,388	94,591	97,131	108,652	121,015	133,611	145,016
Fewer than 500.....		(S)	(S)	(S)	11,285	11,532	13,006	12,802	14,684	17,948	21,854	26,739
500 to 999.....		1,748	1,934	2,144	7,819	7,807	3,048	3,426	4,468	4,418	4,590	5,132
1,000 to 4,999.....		6,820	7,546	8,363	9,403	10,865	12,219	13,533	16,162	17,761	19,049	20,905
5,000 to 9,999.....		4,075	4,509	4,997	7,233	7,495	8,371	8,087	9,289	11,068	13,655	13,517
10,000 to 24,999.....		10,512	11,631	12,890	12,397	12,328	12,606	13,625	15,125	19,133	20,597	23,921
25,000 or more.....		36,785	40,703	45,106	42,443	44,361	45,340	45,658	48,924	50,686	53,866	54,802

¹ Beginning in 1996 manufacturing companies with fewer than 50 employees and nonmanufacturing companies with fewer than 15 employees were sampled separately without regard to industry classification to minimize year-to-year variation in survey estimates. Estimates for manufacturing companies in this group are combined with those for companies in "Other manufacturing industries." Estimates for nonmanufacturing companies in this group are combined with those for companies in "Other nonmanufacturing industries." As a result, statistics for "Other manufacturing industries" and for "Other nonmanufacturing industries" after 1995 are not comparable with statistics for prior years.

² Until 1995, data were not broken down below this level of detail for most nonmanufacturing industries.

³ As a result of a new sample design, statistics for 1988–91 have been revised since originally published. These statistics now better reflect R&D performance among firms in the nonmanufacturing industries and small firms in all industries.

⁴ As a result of the new sample design, statistics for 1991 and later years are not directly comparable with statistics for 1990 and earlier years. See the technical notes for more information.

KEY: (D) = Data have been withheld to avoid disclosing operations of individual companies.

(S) = Indicates imputation of more than 50 percent. For years prior to 1993, data have been withheld.

NA = Not available.

NOTE: The R&D in this table is the industrial R&D performed within company facilities funded from all sources except the Federal Government. The funds predominantly are the company's own, but also include funds from outside organizations such as other companies, research institutions, universities and colleges, nonprofit organizations, and State governments. Excluded from this table are company-funded R&D not performed within the company (e.g., R&D contracted out to other organizations) and company-funded R&D not performed in the U.S. (e.g., R&D not performed on U.S. soil by foreign subsidiaries or other foreign organizations).

SOURCE: National Science Foundation/Division of Science Resources Studies, Survey of Industrial Research and Development: 1998

Table A-8. Company and other (except Federal) funds for industrial R&D performance, by industry and by size of company: 1998

Page 1 of 3

Industry	SIC code	Total	Size of company					
			Fewer than 500 employees	500 to 999 employees	1,000 to 4,999 employees	5,000 to 9,999 employees	10,000 to 24,999 employees	25,000 or more employees
[In millions of dollars]								
All industries.....		145,016	26,736	5,132	20,905	13,517	23,921	54,802
Manufacturing.....		102,211	8,914	2,808	15,432	10,878	17,993	46,185
Food, kindred, and tobacco products.....	20,21	1,711	59	49	229	412	240	722
Textiles and apparel.....	22,23	543	(D)	(D)	(D)	(D)	(D)	(D)
Lumber, wood products, and furniture.....	24,25	359	42	20	100	125	72	0
Paper and allied products.....	26	1,583	149	51	135	98	347	804
Chemicals and allied products.....	28	21,282	1,995	290	4,267	2,728	6,766	5,236
Industrial chemicals.....	281-82,286	6,467	1,548	194	1,061	825	(D)	(D)
Drugs and medicines.....	283	12,566	307	46	2,646	1,424	4,869	3,275
Other chemicals.....	284-85,287-89	2,249	141	50	560	479	(D)	(D)
Petroleum refining and extraction.....	13,29	1,802	32	7	75	50	765	874
Rubber products.....	30	1,607	230	101	411	(D)	264	(D)
Stone, clay, and glass products.....	32	592	12	12	69	98	401	0
Primary metals.....	33	720	50	27	150	143	(S) 187	162
Ferrous metals and products.....	331-32,3398-99	405	45	2	56	(D)	(D)	(D)
Nonferrous metals and products.....	333-36	315	6	26	94	(D)	(D)	(D)
Fabricated metal products.....	34	1,551	244	86	144	159	369	551
Machinery.....	35	14,846	1,266	594	(D)	1,493	4,509	(D)
Office, computing, and accounting machines.....	357	8,890	424	222	(D)	805	2,678	(D)
Other machinery, except electrical.....	351-56,358-59	5,956	842	372	(D)	688	1,830	(D)
Electrical equipment.....	36	24,378	1,548	888	3,869	2,899	2,273	12,901
Radio and TV receiving equipment.....	365	155	24	(D)	121	0	0	(D)
Communication equipment.....	366	10,173	382	290	981	804	0	7,716
Electronic components.....	367	9,776	842	(D)	2,175	1,829	1,752	(D)
Other electrical equipment.....	361-64,369	4,273	299	(D)	592	266	520	(D)

See explanatory information and SOURCE at end of table.

Table A-8. Company and other (except Federal) funds for industrial R&D performance, by industry and by size of company: 1998

Page 2 of 3

Industry	SIC code	Total	Size of company					
			Fewer than 500 employees	500 to 999 employees	1,000 to 4,999 employees	5,000 to 9,999 employees	10,000 to 24,999 employees	25,000 or more employees
[In millions of dollars]								
Transportation equipment.....	37	18,948	(D)	(D)	503	631	(D)	16,848
Motor vehicles and motor vehicles equipment.....	371	13,502	115	(D)	360	(D)	615	(D)
Other transportation equipment.....	373-75,379	339	89	(D)	47	(D)	0	(D)
Aircraft and missiles.....	372,376	5,108	(D)	(D)	96	189	(D)	4,688
Professional and scientific instruments.....	38	9,625	1,145	596	2,155	1,463	808	3,458
Scientific and mechanical measuring instruments.....	381-82	3,614	656	438	660	579	(D)	(D)
Optical, surgical, photographic, and other instruments.....	384-87	6,011	489	158	1,495	883	(D)	(D)
Other manufacturing industries ¹	27,31,39	2,664	1,877	30	212	329	140	77
Nonmanufacturing		42,805	17,825	2,324	5,472	2,638	5,928	8,617
Transportation and utilities.....	40-42,44-49	2,219	68	13	132	36	127	1,844
Communications.....	48	1,768	49	(D)	(D)	0	(D)	(D)
Telephone communications.....	481	1,665	32	0	0	0	(D)	(D)
Other communications.....	482-484,489	103	18	(D)	(D)	0	0	(D)
Electric, gas, and sanitary services.....	49	182	4	(D)	59	(D)	76	(D)
Other transportation and utilities.....	40-42,44-47	269	15	3	(D)	(D)	(D)	223
Trade.....	50-59	11,273	2,617	260	1,241	1,054	(D)	(D)
Finance, insurance, and real estate.....	60-65,67	1,623	132	27	289	253	(D)	(D)
Services.....	701,72,73,75-81, 83,84,87,89	24,392	12,225	2,018	3,658	1,240	3,922	1,330
Business services.....	73	14,682	4,667	1,100	3,272	(D)	(D)	(D)
Computer and data processing services.....	737	14,297	4,510	1,078	3,213	(D)	(D)	(D)
Other business services.....	731-736,738	385	157	22	(S) 59	(D)	(D)	36

See explanatory information and SOURCE at end of table.

Table A-8. Company and other (except Federal) funds for industrial R&D performance, by industry and by size of company: 1998

Page 3 of 3

Industry	SIC code	Total	Size of company					
			Fewer than 500 employees	500 to 999 employees	1,000 to 4,999 employees	5,000 to 9,999 employees	10,000 to 24,999 employees	25,000 or more employees
[In millions of dollars]								
Health services.....	80	1,173	615	(D)	(D)	(D)	(D)	0
Offices and clinics of medical doctors, hospitals, medical, and dental labs.....	801,806,807	1,074	549	(D)	(D)	0	(D)	0
Other health services.....	802-805,808-809	99	66	0	(D)	(D)	0	0
Engineering and management services.....	87	8,182	6,865	905	241	(D)	(D)	(D)
Engineering, architectural, and surveying.....	871	835	540	83	(D)	(D)	(D)	(D)
Research, development, and testing.....	873	6,780	6,026	661	(D)	0	0	(D)
Other engineering and management services.....	872,874	567	299	161	67	(D)	(D)	6
Other services.....	701,72,75-79,81, 83,84,89	354	79	(D)	(D)	(D)	(D)	(D)
Other nonmanufacturing industries ¹	07-12,14,15, 161-162,17	3,298	2,783	7	153	56	(D)	(D)

¹ Manufacturing companies with fewer than 50 employees and nonmanufacturing companies with fewer than 15 employees were sampled separately without regard to industry classification to minimize year-to-year variation in survey estimates. Estimates for manufacturing companies in this group are combined with those for companies in "Other manufacturing industries." Estimates for nonmanufacturing companies in this group are combined with those for companies in "Other nonmanufacturing industries."

KEY: (D) = Data have been withheld to avoid disclosing operations of individual companies.

(S) = Indicates imputation of more than 50 percent.

NOTE: The R&D in this table is the industrial R&D performed within company facilities funded from all sources except the Federal Government. The funds predominantly are the company's own, but also include funds from outside organizations such as other companies, research institutions, universities and colleges, nonprofit organizations, and State governments. Excluded from this table are company-funded R&D not performed within the company (e.g., R&D contracted out to other organizations) and company-funded R&D not performed in the U.S. (e.g., R&D not performed on U.S. soil by foreign subsidiaries or other foreign organizations).

SOURCE: National Science Foundation/Division of Science Resources Studies, Survey of Industrial Research and Development: 1998

**Table A-9. Company and other (except Federal) funds for industrial R&D contracted to outside organizations
by R&D-performing companies, by industry and by size of company: 1991, 1993–98**

Page 1 of 3

Industry and size of company	SIC code	1991 ³	1993	1994	1995	1996	1997	1998
[In millions of dollars]								
Distribution by industry:								
All industries.....		3,319	3,462	3,618	5,177	5,833	6,000	6,710
Manufacturing.....		2,577	2,339	2,450	3,812	4,293	4,143	4,641
Food, kindred, and tobacco products.....	20,21	44	43	43	41	50	53	55
Textiles and apparel.....	22,23	(D)	2	4	1	3	9	0
Lumber, wood products, and furniture.....	24,25	(D)	8	8	7	(D)	(D)	(D)
Paper and allied products.....	26	12	5	4	14	4	(S) 4	5
Chemicals and allied products.....	28	1,087	1,117	1,239	2,386	2,537	2,505	2,932
Industrial chemicals.....	281–82,286	95	43	38	259	229	(D)	42
Drugs and medicines.....	283	771	942	1,055	1,751	2,098	2,259	2,616
Other chemicals.....	284–85,287–89	221	132	146	376	210	(D)	274
Petroleum refining and extraction.....	13,29	35	56	52	32	24	(D)	34
Rubber products.....	30	18	65	22	32	36	32	40
Stone, clay, and glass products.....	32	(D)	2	6	2	9	(D)	(D)
Primary metals.....	33	24	12	15	13	16	9	81
Ferrous metals and products.....	331–32,3398–99	4	8	10	5	4	4	79
Nonferrous metals and products.....	333–36	20	4	5	8	11	5	1
Fabricated metal products.....	34	3	21	21	10	28	10	13
Machinery.....	35	256	125	200	201	330	363	223
Office, computing, and accounting machines.....	357	229	52	113	84	220	192	66
Other machinery, except electrical.....	351–56,358–59	27	73	87	117	110	171	157
Electrical equipment.....	36	114	143	116	194	178	186	310
Radio and TV receiving equipment.....	365	0	(D)	1	2	(D)	(D)	(D)
Communication equipment.....	366	63	20	38	40	(D)	67	(D)
Electronic components.....	367	38	24	24	75	88	44	62
Other electrical equipment.....	361–64,369	13	(D)	54	77	54	(D)	(D)
Transportation equipment.....	37	687	(D)	591	(D)	(D)	(D)	(D)
Motor vehicles and motor vehicles equipment.....	371	(D)	(D)	(D)	(D)	(D)	(D)	(D)
Other transportation equipment.....	373–75,379	(S)	(D)	(D)	5	(D)	(D)	(D)
Aircraft and missiles.....	372,376	(D)	52	83	72	(D)	(D)	(D)

See explanatory information and SOURCE at end of table.

**Table A-9. Company and other (except Federal) funds for industrial R&D contracted to outside organizations
by R&D-performing companies, by industry and by size of company: 1991, 1993–98**

Page 2 of 3

Industry and size of company	SIC code	1991 ³	1993	1994	1995	1996	1997	1998
[In millions of dollars]								
Distribution by industry:								
Professional and scientific instruments.....	38	(D)	189	57	114	55	83	46
Scientific and mechanical measuring instruments.....	381-82	4	25	16	45	8	24	14
Optical, surgical, photographic, and other instruments...	384-87	(D)	163	40	68	47	60	32
Other manufacturing industries ¹	27,31,39	2	(D)	72	(D)	26	122	51
Nonmanufacturing ²		742	1,123	1,168	1,365	1,540	1,857	2,069
Transportation and Utilities.....	40-42,44-49	NA	NA	NA	509	466	405	348
Communications.....	48	NA	NA	NA	264	230	(D)	(D)
Telephone communications.....	481	NA	NA	NA	(D)	(D)	(D)	(D)
Other communications.....	482-484,489	NA	NA	NA	(D)	(D)	0	0
Electric, gas, and sanitary services.....	49	NA	NA	NA	219	229	207	165
Other transportation and utilities.....	40-42,44-47	NA	NA	NA	27	6	(D)	(D)
Trade.....	50-59	NA	NA	NA	346	217	353	359
Finance, insurance, and real estate.....	60-65,67	NA	NA	NA	92	(S) 153	184	302
Services.....	701,72,73,75-81, 83,84,87,89	NA	NA	NA	416	694	905	1,047
Business services.....	73	NA	NA	NA	151	226	235	251
Computer and data processing services.....	737	NA	NA	NA	139	224	233	250
Other business services.....	73-736,738	NA	NA	NA	12	2	2	1
Health services.....	80	NA	NA	NA	38	(S) 66	(D)	(D)
Offices and clinics of medical doctors, hospitals, medical, and dental labs.....	801,806,807	NA	NA	NA	(D)	(D)	(D)	(D)
Other health services.....	802-805,808-809	NA	NA	NA	(D)	(D)	(D)	17
Engineering and management services.....	87	NA	NA	NA	200	396	483	620
Engineering, architectural, and surveying.....	871	NA	NA	NA	13	22	11	6
Research, development, and testing.....	873	NA	NA	NA	187	373	472	554
Other engineering and management services.....	872,874	NA	NA	NA	0	0	0	60

See explanatory information and SOURCE at end of table.

**Table A-9. Company and other (except Federal) funds for industrial R&D contracted to outside organizations
by R&D-performing companies, by industry and by size of company: 1991, 1993–98**

Page 3 of 3

Industry and size of company	SIC code	1991 ³	1993	1994	1995	1996	1997	1998
[In millions of dollars]								
Distribution by industry:								
Other services.....	701,72,75–79,81, 83,84,89	NA	NA	NA	27	6	(D)	(D)
Other nonmanufacturing industries ¹	07–12,14,15, 161–162,17	NA	NA	NA	1	10	10	14
Distribution by size of company: [Number of employees]								
Total.....		3,319	3,462	3,618	5,177	5,833	6,000	6,710
Fewer than 500.....		(S)	751	724	674	699	799	1,005
500 to 999.....		35	107	126	174	161	220	138
1,000 to 4,999.....		275	310	397	632	632	984	1,214
5,000 to 9,999.....		218	327	408	393	761	992	589
10,000 to 24,999.....		881	468	391	786	1,458	1,031	1,318
25,000 or more.....		1,762	1,497	1,574	2,518	2,121	1,974	2,446

¹ Beginning in 1996 manufacturing companies with fewer than 50 employees and nonmanufacturing companies with fewer than 15 employees were sampled separately without regard to industry classification to minimize year-to-year variation in survey estimates. Estimates for manufacturing companies in this group are combined with those for companies in "Other manufacturing industries." Estimates for nonmanufacturing companies in this group are combined with those for companies in "Other nonmanufacturing industries." As a result, statistics for "Other manufacturing industries" and for "Other nonmanufacturing industries" after 1995 are not comparable with statistics for prior years.

² Until 1995, data were not broken down below this level of detail for most nonmanufacturing industries.

³ As a result of a new sample design, statistics for 1991 have been revised since originally published. These statistics now better reflect R&D performance among firms in the nonmanufacturing industries and small firms in all industries. See technical notes for more information.

KEY: (D) = Data have been withheld to avoid disclosing operations of individual companies.

(S) = Indicates imputation of more than 50 percent. For years prior to 1993, data have been withheld.

NA = Not available.

NOTE: The R&D in this table is the industrial R&D performed outside company facilities funded from all sources except the Federal Government. The funds predominantly are the company's own, but also include funds from outside organizations such as other companies, research institutions, universities and colleges, nonprofit organizations, and State governments. Excluded from this table is company-funded R&D not performed in the U.S. (e.g., R&D not performed on U.S. soil by foreign subsidiaries or other foreign organizations).

SOURCE: National Science Foundation/Division of Science Resources Studies, Survey of Industrial Research and Development: 1998

Table A-10. Number of R&D-performing companies contracting company and other (except Federal) industrial R&D to outside organizations and total number of R&D-performing companies, by industry and by size of company: 1998

Page 1 of 3

Industry	SIC code	Total		Size of company											
				Fewer than 500 employees		500 to 999 employees		1,000 to 4,999 employees		5,000 to 9,999 employees		10,000 to 24,999 employees		25,000 or more employees	
		Total	Outside	Total	Outside	Total	Outside	Total	Outside	Total	Outside	Total	Outside	Total	Outside
All industries.....		41,923	3,053	38,921	2,557	1,158	169	1,244	191	288	65	183	44	128	27
Manufacturing.....		20,808	1,748	18,731	1,422	731	98	918	138	227	45	132	27	71	19
Food, kindred, and tobacco products.....	20,21	490	29	322	0	53	9	70	11	20	5	13	3	12	2
Textiles and apparel.....	22,23	138	9	51	1	39	0	31	7	7	1	7	0	2	0
Lumber, wood products, and furniture.....	24,25	271	6	216	2	13	0	27	2	11	2	5	0	0	0
Paper and allied products.....	26	285	13	201	0	20	0	39	9	11	4	8	0	6	0
Chemicals and allied products.....	28	706	178	506	128	73	12	81	21	27	7	14	6	5	4
Industrial chemicals.....	281-82,286	149	10	52	2	52	0	27	5	11	1	6	1	1	1
Drugs and medicines.....	283	151	71	109	52	3	1	25	10	5	1	6	5	3	2
Other chemicals.....	284-85,287-89	406	97	345	74	18	11	29	6	11	5	2	0	1	1
Petroleum refining and extraction.....	13,29	126	53	98	49	2	0	5	0	8	1	9	3	3	0
Rubber products.....	30	768	84	613	62	69	11	68	9	11	0	4	1	3	1
Stone, clay, and glass products.....	32	232	10	198	0	4	1	13	1	12	7	5	1	0	0
Primary metals.....	33	158	47	61	24	22	1	50	14	16	5	6	2	3	1
Ferrous metals and products.....	331-32,3398-99	107	43	54	24	2	0	33	12	13	5	4	1	1	1
Nonferrous metals and products.....	333-36	51	4	7	0	20	1	17	2	3	0	2	1	2	0
Fabricated metal products.....	34	1,136	183	973	153	80	9	58	16	12	2	9	2	4	1
Machinery.....	35	1,883	174	1,563	141	147	15	126	11	26	2	18	4	3	1
Office, computing, and accounting machines.....	357	136	10	86	6	22	1	16	2	6	0	5	1	1	0
Other machinery, except electrical.....	351-56,358-59	1,747	164	1,477	135	125	14	110	9	20	2	13	3	2	1
Electrical equipment.....	36	1,124	112	858	80	96	6	125	18	22	4	14	2	9	2
Radio and TV receiving equipment....	365	15	1	11	0	1	1	3	0	0	0	0	0	0	0
Communication equipment.....	366	103	9	65	2	12	2	17	4	5	0	0	0	4	1
Electronic components.....	367	600	89	467	78	52	2	64	8	10	1	5	0	1	0
Other electrical equipment.....	361-64,369	406	13	314	0	31	1	41	6	7	3	9	2	4	1

See explanatory information and SOURCE at end of table.

Table A-10. Number of R&D-performing companies contracting company and other (except Federal) industrial R&D to outside organizations and total number of R&D-performing companies, by industry and by size of company: 1998

Page 2 of 3

Industry	SIC code	Total		Size of company											
				Fewer than 500 employees		500 to 999 employees		1,000 to 4,999 employees		5,000 to 9,999 employees		10,000 to 24,999 employees		25,000 or more employees	
		Total	Outside	Total	Outside	Total	Outside	Total	Outside	Total	Outside	Total	Outside	Total	Outside
Transportation equipment.....	37	542	59	387	47	3	0	109	2	21	3	7	2	14	5
Motor vehicles and motor vehicles equipment.....	371	316	52	190	47	1	0	99	0	14	1	6	2	5	2
Other transportation equipment.....	373-75,379	203	1	195	0	1	0	4	1	1	0	0	0	2	0
Aircraft and missiles.....	372,376	23	6	2	0	1	0	6	1	6	2	1	0	7	3
Professional and scientific instruments...	38	655	65	498	40	63	9	72	14	13	2	5	0	4	0
Scientific and mechanical measuring instruments.....	381-82	355	43	286	33	33	5	27	4	4	1	3	0	2	0
Optical, surgical, photographic, and other instruments.....	384-87	299	22	211	7	30	4	45	10	9	1	2	0	2	0
Other manufacturing industries ¹	27,31,39	12,295	725	12,186	695	47	23	42	4	9	0	7	1	3	2
Nonmanufacturing		21,115	1,305	20,191	1,135	428	71	327	53	61	20	52	17	57	8
Transportation and utilities.....	40-42,44-49	324	102	176	0	60	49	41	24	18	14	13	10	16	5
Communications.....	48	113	4	100	0	1	0	2	0	0	0	1	1	9	3
Telephone communications.....	481	60	4	51	0	0	0	0	0	0	0	1	1	8	3
Other communications.....	482-484,489	53	0	49	0	1	0	2	0	0	0	0	0	1	0
Electric, gas, and sanitary services....	49	110	90	4	0	54	49	27	22	16	12	9	6	1	1
Other transportation and utilities.....	40-42,44-47	101	8	72	0	6	0	12	2	2	2	3	3	6	1
Trade.....	50-59	3,752	282	3,368	270	222	3	127	6	8	1	6	1	21	1
Finance, insurance, and real estate.....	60-65,67	392	60	332	50	7	1	31	4	6	2	9	2	8	1
Services.....	701,72,73,75-81, 83,84,87,89	6,170	616	5,886	575	117	17	113	16	20	3	23	4	11	1
Business services.....	73	3,448	381	3,279	358	76	5	65	14	13	3	8	1	8	1
Computer and data processing services.....	737	3,069	377	2,924	357	72	4	53	12	10	2	5	1	4	1
Other business services.....	731-736,738	380	5	354	1	4	1	11	1	3	1	3	0	4	0

See explanatory information and SOURCE at end of table.

Table A-10. Number of R&D-performing companies contracting company and other (except Federal) industrial R&D to outside organizations and total number of R&D-performing companies, by industry and by size of company: 1998

Page 3 of 3

Industry	SIC code	Total		Size of company											
				Fewer than 500 employees		500 to 999 employees		1,000 to 4,999 employees		5,000 to 9,999 employees		10,000 to 24,999 employees		25,000 or more employees	
		Total	Outside	Total	Outside	Total	Outside	Total	Outside	Total	Outside	Total	Outside	Total	Outside
Health services.....	80	482	9	475	7	1	0	3	1	1	0	2	1	0	0
Offices and clinics of medical doctors, hospitals, medical and dental labs.....	801,806,807	365	2	361	1	1	0	1	0	0	0	2	1	0	0
Other health services.....	802-805,808-809	118	7	115	6	0	0	2	1	1	0	0	0	0	0
Engineering and management services.....	87	1,776	222	1,704	209	36	11	26	1	4	0	4	1	2	0
Engineering, architectural, and surveying.....	871	491	9	453	6	13	2	20	0	2	0	3	1	0	0
Research, development, and testing.....	873	940	175	930	172	8	3	1	0	0	0	0	0	1	0
Other engineering and management services.....	872,874	345	38	321	31	14	6	5	1	2	0	1	0	1	0
Other services.....	701,72,75-79,81, 83,84,89	464	3	428	1	4	1	20	0	2	0	9	1	1	0
Other nonmanufacturing industries ¹	07-12,14,15, 161-162,17	10,477	245	10,429	240	22	1	15	4	9	0	1	0	1	0

¹ Manufacturing companies with fewer than 50 employees and nonmanufacturing companies with fewer than 15 employees were sampled separately without regard to industry classification to minimize year-to-year variation in survey estimates. Estimates for manufacturing companies in this group are combined with those for companies in "Other manufacturing industries." Estimates for nonmanufacturing companies in this group are combined with those for companies in "Other nonmanufacturing industries."

SOURCE: National Science Foundation/Division of Science Resources Studies, Survey of Industrial Research and Development: 1998

Table A-11. Company and other (except Federal) funds for R&D performed outside the United States by U.S. R&D-performing domestic companies and their foreign subsidiaries, by industry and by size of company: 1988–98

Page 1 of 4

Industry	SIC code	1988 ⁴	1989 ⁴	1990 ⁴	1991 ^{4,5}	1992 ⁵	1993 ⁵	1994 ⁵	1995 ⁵	1996 ⁵	1997 ⁵	1998 ⁵
[In millions of dollars]												
Distribution by industry:												
All industries.....		6,208	6,706	7,952	9,147	10,063	9,565	9,395	13,052	14,050	13,107	16,008
Manufacturing.....		6,062	6,450	7,537	8,369	9,228	7,795	7,895	10,846	11,540	11,743	12,768
Food, kindred, and tobacco products.....	20,21	27	42	41	66	88	112	117	142	155	148	190
Textiles and apparel.....	22,23	NA	NA	NA	NA	NA	NA	NA	NA	NA	(D)	(D)
Lumber, wood products, and furniture.....	24,25	NA	NA	NA	NA	NA	NA	NA	NA	NA	(D)	(D)
Paper and allied products.....	26	NA	NA	NA	NA	NA	NA	NA	NA	NA	34	52
Chemicals and allied products.....	28	1,548	1,532	2,007	2,401	2,676	2,833	2,456	4,194	3,801	3,867	4,186
Industrial chemicals ¹	281–82,286	855	609	720	1,009	1,045	1,318	917	1,632	1,720	863	922
Drugs and medicines.....	283	693	923	1,287	1,392	1,631	1,516	1,539	2,562	2,082	2,413	2,608
Other chemicals.....	284–85,287–89	TA	TA	TA	TA	TA	TA	TA	TA	TA	591	656
Petroleum refining and extraction.....	13,29	59	47	76	107	119	104	111	76	78	91	75
Rubber products.....	30	NA	NA	NA	NA	NA	NA	NA	NA	NA	197	261
Stone, clay, and glass products.....	32	(D)	(D)	59	38	41	38	27	31	32	17	40
Primary metals.....	33	23	24	26	20	18	12	15	26	29	20	26
Ferrous metals and products.....	331–32,3398–99	NA	NA	NA	NA	NA	NA	NA	NA	NA	(D)	13
Nonferrous metals and products.....	333–36	NA	NA	NA	NA	NA	NA	NA	NA	NA	(D)	13
Fabricated metal products.....	34	(D)	(D)	95	86	109	119	125	111	133	132	140
Machinery.....	35	1,326	1,432	1,451	1,476	1,439	340	308	501	1,404	1,819	1,324
Office, computing, and accounting machines.....	357	NA	NA	NA	NA	NA	NA	NA	NA	NA	1,196	608
Other machinery, except electrical.....	351–56,358–59	NA	NA	NA	NA	NA	NA	NA	NA	NA	623	716
Electrical equipment.....	36	591	573	770	651	568	525	495	872	959	981	1,152
Radio and TV receiving equipment.....	365	(D)	(D)	(D)	2	(D)	(D)	3	(D)	(D)	0	(D)
Communication equipment.....	366	290	199	174	151	(D)	(D)	110	(D)	(D)	399	455
Electronic components.....	367	246	160	185	164	168	322	276	437	470	362	404
Other electrical equipment.....	361–64,369	(D)	(D)	(D)	334	217	113	107	291	260	220	(D)

See explanatory information and SOURCE at end of table.

Table A-11. Company and other (except Federal) funds for R&D performed outside the United States by U.S. R&D-performing domestic companies and their foreign subsidiaries, by industry and by size of company: 1988–98

Page 2 of 4

Industry	SIC code	1988 ⁴	1989 ⁴	1990 ⁴	1991 ^{4,5}	1992 ⁵	1993 ⁵	1994 ⁵	1995 ⁵	1996 ⁵	1997 ⁵	1998 ⁵
[In millions of dollars]												
Distribution by industry:												
Transportation equipment.....	37	1,750	1,916	2,055	2,402	(D)						
Motor vehicles and motor vehicles equipment ¹	371	1,477	1,501	1,901	2,166	(D)						
Other transportation equipment.....	373–75,379	TA	TA	TA	TA	TA	TA	TA	TA	TA	19	(D)
Aircraft and missiles.....	372,376	273	415	154	236	493	(D)	251	284	(D)	(D)	(D)
Professional and scientific instruments.....	38	404	474	611	656	685	751	900	988	960	1,201	1,248
Scientific and mechanical measuring instruments.....	381–82	NA	NA	NA	NA	NA	NA	NA	NA	NA	200	203
Optical, surgical, photographic, and other instruments.....	384–87	NA	NA	NA	NA	NA	NA	NA	NA	NA	1,001	1,045
Other manufacturing industries ²	27,31,39	178	269	344	467	524	(D)	572	(D)	(D)	86	36
Nonmanufacturing ³		146	256	415	778	835	1,770	1,500	2,206	2,510	1,364	3,240
Transportation and utilities.....	40–42,44–49	NA	NA	NA	NA	NA	NA	NA	NA	NA	6	(D)
Communications.....	48	NA	NA	NA	NA	NA	NA	NA	NA	NA	(D)	(D)
Telephone communications.....	481	NA	NA	NA	NA	NA	NA	NA	NA	NA	(D)	(D)
Other communications.....	482–484,489	NA	NA	NA	NA	NA	NA	NA	NA	NA	0	0
Electric, gas, and sanitary services.....	49	NA	NA	NA	NA	NA	NA	NA	NA	NA	(D)	(D)
Other transportation and utilities.....	40–42,44–47	NA	NA	NA	NA	NA	NA	NA	NA	NA	(D)	(D)
Trade.....	50–59	NA	NA	NA	NA	NA	NA	NA	NA	NA	408	1,350
Finance, insurance, and real estate.....	60–65,67	NA	NA	NA	NA	NA	NA	NA	NA	NA	0	(D)

See explanatory information and SOURCE at end of table.

Table A-11. Company and other (except Federal) funds for R&D performed outside the United States by U.S. R&D-performing domestic companies and their foreign subsidiaries, by industry and by size of company: 1988–98

Page 3 of 4

Industry	SIC code	1988 ⁴	1989 ⁴	1990 ⁴	1991 ^{4,5}	1992 ⁵	1993 ⁵	1994 ⁵	1995 ⁵	1996 ⁵	1997 ⁵	1998 ⁵
[In millions of dollars]												
Distribution by industry:												
Services.....	701,72,73,75– 81,83,84,87,89	NA	NA	NA	NA	NA	NA	NA	NA	NA	914	1,780
Business services.....	73	NA	NA	NA	NA	NA	NA	NA	NA	NA	786	1,462
Computer and data processing services.....	737	NA	NA	NA	NA	NA	NA	NA	NA	NA	(D)	(D)
Other business services.....	731–736,738	NA	NA	NA	NA	NA	NA	NA	NA	NA	(D)	(D)
Health services.....	80	NA	NA	NA	NA	NA	NA	NA	NA	NA	(D)	(D)
Offices and clinics of medical doctors, hospitals, medical and dental labs.....	801,806,807	NA	NA	NA	NA	NA	NA	NA	NA	NA	(D)	(D)
Other health services.....	802–805,808–809	NA	NA	NA	NA	NA	NA	NA	NA	NA	(D)	(D)
Engineering and management services.....	87	NA	NA	NA	NA	NA	NA	NA	NA	NA	89	293
Engineering, architectural, and surveying.....	871	NA	NA	NA	NA	NA	NA	NA	NA	NA	10	13
Research, development, and testing.....	873	NA	NA	NA	NA	NA	NA	NA	NA	NA	75	279
Other engineering and management services.....	872, 874	NA	NA	NA	NA	NA	NA	NA	NA	NA	3	0
Other services.....	701,72,75–79,81, 83,84,89	NA	NA	NA	NA	NA	NA	NA	NA	NA	(D)	(D)
Other nonmanufacturing industries ²	07–12,14,15, 161–162,17	NA	NA	NA	NA	NA	NA	NA	NA	NA	36	87

See explanatory information and SOURCE at end of table.

Table A-11. Company and other (except Federal) funds for R&D performed outside the United States by U.S. R&D-performing domestic companies and their foreign subsidiaries, by industry and by size of company: 1988–98

Page 4 of 4

Industry	SIC code	1988 ⁴	1989 ⁴	1990 ⁴	1991 ^{4,5}	1992 ⁵	1993 ⁵	1994 ⁵	1995 ⁵	1996 ⁵	1997 ⁵	1998 ⁵
[In millions of dollars]												
Distribution by size of company: [Number of employees]												
Total.....		6,208	6,706	7,952	9,147	10,063	9,565	9,395	13,052	14,050	13,107	16,008
Fewer than 500.....		NA	NA	NA	NA	NA	NA	NA	NA	NA	324	667
500 to 999.....		NA	NA	NA	NA	NA	NA	NA	NA	NA	205	172
1,000 to 4,999.....		NA	NA	NA	NA	NA	NA	NA	NA	NA	2,057	2,080
5,000 to 9,999.....		NA	NA	NA	NA	NA	NA	NA	NA	NA	1,352	1,009
10,000 to 24,999.....		NA	NA	NA	NA	NA	NA	NA	NA	NA	2,632	3,381
25,000 or more.....		NA	NA	NA	NA	NA	NA	NA	NA	NA	6,537	8,700

¹ Until 1997, the values for Industrial chemicals (SIC 281–282,286) and Other chemicals (SIC 284–285,287–289) were combined and displayed as Industrial and other chemicals (SIC 281–282, 284–289). Also, the value for Motor vehicles and motor vehicles equipment (SIC 371) and Other transportation equipment (SIC 373–375,379) were combined and displayed as Motor vehicles and other transportation (SIC 371,373–375,379).

² Beginning in 1996 manufacturing companies with fewer than 50 employees and nonmanufacturing companies with fewer than 15 employees were sampled separately without regard to industry classification to minimize year-to-year variation in survey estimates. Estimates for manufacturing companies in this group are combined with those for companies in "Other manufacturing industries." Estimates for nonmanufacturing companies in this group are combined with those for companies in "Other nonmanufacturing industries." As a result, statistics for "Other manufacturing industries" and for "Other nonmanufacturing industries" after 1995 are not comparable with statistics for prior years.

³ Until 1997, data were not broken down below this level of detail for nonmanufacturing industries.

⁴ As a result of a new sample design, statistics for 1988–91 have been revised since originally published. These statistics now better reflect R&D performance among firms in the nonmanufacturing industries and small firms in all industries.

⁵ As a result of the new sample design, statistics for 1991 and later years are not directly comparable with statistics for 1990 and earlier years. See the technical notes for more information.

KEY: (D) = Data have been withheld to avoid disclosing operations of individual companies.

TA = Total not available separately.

NA = Not available.

NOTES: Data are reported in current U.S. dollars.

The R&D in this table is the industrial R&D performed outside the U.S. by a company's foreign subsidiaries or other foreign organizations funded from all sources except the Federal Government. The funds predominantly are the company's own, but also include funds from outside organizations such as other companies, research institutions, universities and colleges, nonprofit organizations, and State governments. Excluded from this table is company-funded R&D performed in the U.S. (e.g., R&D performed on U.S. soil by foreign subsidiaries or other foreign organizations).

SOURCE: National Science Foundation/Division of Science Resources Studies, Survey of Industrial Research and Development: 1998

Table A-12. Company and other (except Federal) industrial R&D performed outside the United States by U. S. R&D-performing domestic companies and their foreign subsidiaries, by country: 1998

Location of foreign subsidiary	Number of companies	Total [In millions of dollars]
Distribution by country:		
Total.....	1,980 ¹	16,008
Canada.....	140	545
Germany.....	132	2,810
France.....	117	908
Japan.....	82	967
United Kingdom.....	190	1,429
Puerto Rico.....	14	(S) 94
Other countries.....	229	2,273
Undistributed ²	1,577	6,982
Distribution by companies with R&D expenditures in one or more countries:		
Total.....	1,980	16,008
One country.....	101	214
Two countries.....	27	188
Three countries.....	6	17
Four countries.....	1	(D)
Five countries.....	2	(D)
More than five countries.....	0	0
Undistributed ^{2,3}	1,843	15,563

¹ Detail does not add to total because categories are not mutually exclusive.

² Includes data reported on Form RD-1 that were not allocated to a specific country, and total foreign R&D reported on Form RD-1A. Form RD-1A does not collect data by country.

³ To avoid double counting, if a company reported ANY foreign R&D expenditures that were not allocated to specific countries, all foreign R&D expenditures, including those that may have been allocated to specific countries, are included in this cell. For example, if a company allocated a portion of its foreign R&D expenditures to Canada and left the remainder unallocated, ALL of its foreign R&D is included in this cell because it could not be determined during processing how many other countries were sites of R&D performance.

KEY: (D) = Data have been withheld to avoid disclosing operations of individual companies.

(S) = Indicates imputation of more than 50 percent.

NOTES: Data are reported in current U.S. dollars.

The R&D in this table is the industrial R&D performed outside the U.S. by a company's foreign subsidiaries or other foreign organizations funded from all sources except the Federal Government. The funds predominantly are the company's own, but also include funds from outside organizations such as other companies, research institutions, universities and colleges, nonproffit organizations, and State governments. Excluded from this table is company-funded R&D performed in the U.S. (e.g., R&D performed on U.S. soil by foreign subsidiaries or other foreign organizations).

SOURCE: National Science Foundation/Division of Science Resources Studies, Survey of Industrial Research and Development: 1998

Table A-13. Federal funds for industrial R&D performance, by industry and by size of company: 1988-98

Page 1 of 3

Industry and size of company	SIC code	1988 ³	1989 ³	1990 ³	1991 ^{3,4}	1992 ⁴	1993 ⁴	1994 ⁴	1995 ⁴	1996 ⁴	1997 ⁴	1998 ⁴
[In millions of dollars]												
Distribution by industry:												
All industries.....		30,343	28,554	28,125	26,372	24,722	22,809	22,463	23,451	23,653	23,928	24,164
Manufacturing.....		27,088	24,826	23,683	20,867	19,152	16,669	17,373	18,831	20,020	19,823	18,189
Food, kindred, and tobacco products.....	20,21	(D)	(D)	(D)	0	0	0	0	0	0	0	0
Textiles and apparel.....	22,23	(D)	(D)	(D)	(S)	(D)						
Lumber, wood products, and furniture.....	24,25	(D)	0	0	(D)	(D)	(D)	(D)	(D)	(D)	0	14
Paper and allied products.....	26	(D)	0	0	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)
Chemicals and allied products.....	28	238	126	123	209	(S)	(D)	(D)	(S) 210	(D)	(D)	(S) 483
Industrial chemicals.....	281-82,286	232	111	109	165	(S)	(D)	(D)	(D)	(D)	(D)	(D)
Drugs and medicines.....	283	6	(D)	(D)	(D)	(S)	15	8	14	3	(S) 3	5
Other chemicals.....	284-85,287-89	0	(D)	(D)	(D)	(S)	(D)	(D)	(D)	0	(D)	(D)
Petroleum refining and extraction.....	13,29	22	(S)	(S)	11	9	14	10	6	24	(D)	6
Rubber products.....	30	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)
Stone, clay, and glass products.....	32	(D)	(D)	(D)	(D)	(D)	9	38	6	5	2	(D)
Primary metals.....	33	17	22	(D)	8	(S)	23	17	13	(D)	221	(D)
Ferrous metals and products.....	331-32,3398-99	1	(D)	(D)	1	(D)	17	(D)	(D)	(D)	(D)	(D)
Nonferrous metals and products.....	333-36	16	(D)	(D)	7	(D)	6	(D)	(D)	(D)	(D)	(D)
Fabricated metal products.....	34	163	178	203	226	294	222	243	86	(D)	129	43
Machinery.....	35	(D)	(D)	871	1,055	1,035	86	99	(D)	117	106	73
Office, computing, and accounting machines.....	357	(D)	(D)	(D)	(D)	(D)	33	28	(D)	(D)	53	15
Other machinery, except electrical.....	351-56,358-59	101	112	(D)	(D)	(D)	53	71	64	(D)	53	58
Electrical equipment.....	36	4,153	3,743	4,133	4,550	3,844	1,667	1,801	1,690	2,143	1,839	1,613
Radio and TV receiving equipment.....	365	0	0	0	0	(D)	(D)	(D)	(D)	(D)	(D)	0
Communication equipment.....	366	3,630	2,911	2,344	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)
Electronic components.....	367	449	369	418	(D)	247	206	162	(D)	(D)	(D)	(D)
Other electrical equipment.....	361-64,369	74	463	1,371	(D)	(D)	(D)	(D)	(D)	(D)	477	538
Transportation equipment.....	37	20,865	19,262	17,097	12,570	11,202	10,617	10,392	13,130	12,202	12,251	10,330
Motor vehicles and motor vehicles equipment.....	371	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)
Other transportation equipment.....	373-75,379	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)
Aircraft and missiles.....	372,376	18,402	16,828	15,248	11,096	(S)	9,372	8,794	11,462	10,515	10,619	9,341

See explanatory information and SOURCE at end of table.

Table A-13. Federal funds for industrial R&D performance, by industry and by size of company: 1988-98

Page 2 of 3

Industry and size of company	SIC code	1988 ³	1989 ³	1990 ³	1991 ^{3,4}	1992 ⁴	1993 ⁴	1994 ⁴	1995 ⁴	1996 ⁴	1997 ⁴	1998 ⁴
[In millions of dollars]												
Distribution by industry:												
Professional and scientific instruments.....	38	191	263	737	1,865	2,221	2,577	3,384	(S) 3,460	3,942	4,499	(D)
Scientific and mechanical measuring instruments.....	381-82	(S)	(S)	(S)	(D)	2,143	2,484	3,266	(S) 3,358	(D)	4,416	(D)
Optical, surgical, photographic, and other instruments.....	384-87	95	101	87	(D)	78	92	118	102	(D)	84	74
Other manufacturing industries ¹	27,31,39	(D)	(D)	(D)	(D)	61	(D)	(D)	(D)	(D)	156	131
Nonmanufacturing ²		3,256	3,729	4,442	5,505	5,570	6,140	5,090	4,620	3,633	4,105	5,975
Transportation and utilities.....	40-42,44-49	NA	NA	NA	NA	NA	NA	NA	252	186	200	(D)
Communications.....	48	NA	NA	NA	NA	NA	NA	NA	(D)	(D)	(D)	(D)
Telephone communications.....	481	NA	NA	NA	NA	NA	NA	NA	(D)	(D)	(D)	(D)
Other communications.....	482-484,489	NA	NA	NA	NA	NA	NA	NA	0	0	0	(D)
Electric, gas, and sanitary services.....	49	NA	NA	NA	NA	NA	NA	NA	93	42	(D)	(D)
Other transportation and utilities.....	40-42,44-47	NA	NA	NA	NA	NA	NA	NA	(D)	(D)	(D)	(D)
Trade.....	50-59	NA	NA	NA	NA	NA	NA	NA	(D)	(S) 51	(D)	(S) 64
Finance, insurance, and real estate.....	60-65,67	NA	NA	NA	NA	NA	NA	NA	(D)	(D)	(D)	(D)
Services.....	701,72,73,75-81,	NA	NA	NA	NA	NA	NA	NA	4,270	3,118	3,805	4,889
Business services.....	73	NA	NA	NA	NA	NA	NA	NA	612	361	400	540
Computer and data processing services.....	737	NA	NA	NA	NA	NA	NA	NA	514	(D)	389	(D)
Other business services.....	731-736,738	NA	NA	NA	NA	NA	NA	NA	98	(D)	11	(D)
Health services.....	80	NA	NA	NA	NA	NA	NA	NA	4	(D)	(D)	33
Offices and clinics of medical doctors, hospitals, medical and dental labs.....	801,806,807	NA	NA	NA	NA	NA	NA	NA	(D)	3	4	21
Other health services.....	802-805,808-809	NA	NA	NA	NA	NA	NA	NA	(D)	1	(D)	12

See explanatory information and SOURCE at end of table.

Table A-13. Federal funds for industrial R&D performance, by industry and by size of company: 1988-98

Page 3 of 3

Industry and size of company	SIC code	1988 ³	1989 ³	1990 ³	1991 ^{3,4}	1992 ⁴	1993 ⁴	1994 ⁴	1995 ⁴	1996 ⁴	1997 ⁴	1998 ⁴
[In millions of dollars]												
Distribution by industry:												
Engineering and management services....	87	NA	NA	NA	NA	NA	NA	NA	3,650	2,746	(S) 3,381	(S) 3,652
Engineering, architectural, and surveying.....	871	NA	NA	NA	NA	NA	NA	NA	1,883	994	1,258	1,190
Research, development, and testing...	873	NA	NA	NA	NA	NA	NA	NA	(D)	(S) 1,708	(D)	(S) 2,388
Other engineering and management services.....	872,874	NA	NA	NA	NA	NA	NA	NA	(D)	45	(D)	74
Other services.....	701,72,75-79,81, 83,84,89	NA	NA	NA	NA	NA	NA	NA	4	(D)	(D)	663
Other nonmanufacturing industries ¹	07-12,14,15, 161-162,17	NA	NA	NA	NA	NA	NA	NA	11	(D)	77	532
Distribution by size of company: [Number of employees]												
Total.....		30,343	28,554	28,125	26,372	24,722	22,809	22,463	23,451	23,653	23,928	24,164
Fewer than 500.....		816	901	895	1,887	2,025	1,614	1,164	1,978	2,301	2,209	3,436
500 to 999.....		131	117	(S)	181	151	182	182	225	219	376	363
1,000 to 4,999.....		1,093	958	881	1,050	(S)	1,115	1,083	798	512	540	620
5,000 to 9,999.....		864	740	257	816	763	764	825	243	468	612	536
10,000 to 24,999.....		1,705	1,129	1,526	3,373	3,416	2,816	2,348	(S) 1,946	(S) 1,031	913	(S) 955
25,000 or more.....		25,734	24,709	24,436	19,065	17,346	16,319	16,862	18,261	19,122	19,277	18,253

¹ Beginning in 1996 manufacturing companies with fewer than 50 employees and nonmanufacturing companies with fewer than 15 employees were sampled separately without regard to industry classification to minimize year-to-year variation in survey estimates. Estimates for manufacturing companies in this group are combined with those for companies in "Other manufacturing industries." Estimates for nonmanufacturing companies in this group are combined with those for companies in "Other nonmanufacturing industries." As a result, statistics for "Other manufacturing industries" and for "Other nonmanufacturing industries" after 1995 are not comparable with statistics for prior years.

² Until 1995, data were not broken down below this level of detail for most nonmanufacturing industries.

³ As a result of a new sample design, statistics for 1988-91 have been revised since originally published. These statistics now better reflect R&D performance among firms in the nonmanufacturing industries and small firms in all industries.

⁴ As a result of the new sample design, statistics for 1991 and later years are not directly comparable with statistics for 1990 and earlier years. See the technical notes for more information.

KEY: (D) = Data have been withheld to avoid disclosing operations of individual companies.

(S) = Indicates imputation of more than 50 percent.

NA = Not available.

SOURCE: National Science Foundation/Division of Science Resources Studies, Survey of Industrial Research and Development: 1998

Table A-14. Federal funds for industrial R&D performance, by industry and by size of company: 1998

Page 1 of 3

Industry	SIC code	Total	Size of company					
			Fewer than 500 employees	500 to 999 employees	1,000 to 4,999 employees	5,000 to 9,999 employees	10,000 to 24,999 employees	25,000 or more employees
[In millions of dollars]								
All industries.....		24,164	3,436	363	620	536	955	18,253
Manufacturing.....		18,189	490	107	204	520	(D)	(D)
Food, kindred, and tobacco products.....	20,21	0	0	0	0	0	0	0
Textiles and apparel.....	22,23	(D)	0	0	0	0	0	(D)
Lumber, wood products, and furniture.....	24,25	14	5	(D)	(D)	0	0	0
Paper and allied products.....	26	(D)	0	0	0	0	0	(D)
Chemicals and allied products.....	28	(S) 483	124	0	37	9	(D)	(D)
Industrial chemicals.....	281-82,286	(D)	122	0	(D)	9	(D)	(D)
Drugs and medicines.....	283	5	(D)	0	(D)	0	0	0
Other chemicals.....	284-85,287-89	(D)	(D)	0	(D)	0	0	0
Petroleum refining and extraction.....	13,29	6	0	0	0	(D)	3	(D)
Rubber products.....	30	(D)	0	0	0	(D)	0	0
Stone, clay, and glass products.....	32	(D)	0	0	(D)	0	(D)	0
Primary metals.....	33	(D)	(D)	(D)	0	(D)	(D)	(D)
Ferrous metals and products.....	331-32,3398-99	(D)	0	0	0	(D)	(D)	(D)
Nonferrous metals and products.....	333-36	(D)	(D)	(D)	0	0	0	(D)
Fabricated metal products.....	34	43	2	(D)	(D)	(D)	0	(D)
Machinery.....	35	73	10	0	(D)	(S) 4	19	(D)
Office, computing, and accounting machines.....	357	15	2	0	(D)	(D)	0	0
Other machinery, except electrical.....	351-56,358-59	58	8	0	(D)	(D)	19	(D)
Electrical equipment.....	36	1,613	187	8	62	(D)	(D)	1,334
Radio and TV receiving equipment.....	365	0	0	0	0	0	0	0
Communication equipment.....	366	(D)	(D)	0	(D)	(D)	0	(D)
Electronic components.....	367	(D)	(D)	(D)	34	(D)	(D)	0
Other electrical equipment.....	361-64,369	538	139	(D)	(D)	(D)	0	(D)

See explanatory information and SOURCE at end of table.

Table A-14. Federal funds for industrial R&D performance, by industry and by size of company: 1998

Page 2 of 3

Industry	SIC code	Total	Size of company					
			Fewer than 500 employees	500 to 999 employees	1,000 to 4,999 employees	5,000 to 9,999 employees	10,000 to 24,999 employees	25,000 or more employees
[In millions of dollars]								
Transportation equipment.....	37	10,330	(D)	(D)	(D)	(D)	(D)	9,986
Motor vehicles and motor vehicles equipment.....	371	(D)	0	0	(D)	(D)	0	(D)
Other transportation equipment.....	373-75,379	(D)	0	0	0	0	0	(D)
Aircraft and missiles.....	372,376	9,341	(D)	(D)	(D)	(D)	(D)	9,013
Professional and scientific instruments.....	38	(D)	13	73	(D)	13	(D)	(D)
Scientific and mechanical measuring instruments.....	381-82	(D)	(D)	(D)	(D)	(D)	(D)	(D)
Optical, surgical, photographic, and other instruments.....	384-87	74	(D)	(D)	(D)	(D)	0	(D)
Other manufacturing industries ¹	27,31,39	131	128	(D)	0	(D)	0	0
Nonmanufacturing		5,975	2,946	256	417	16	(D)	(D)
Transportation and utilities.....	40-42,44-49	(D)	0	(D)	(D)	(D)	0	(D)
Communications.....	48	(D)	0	0	(D)	0	0	(D)
Telephone communications.....	481	(D)	0	0	0	0	0	(D)
Other communications.....	482-484,489	(D)	0	0	(D)	0	0	(D)
Electric, gas, and sanitary services.....	49	(D)	0	(D)	0	(D)	0	(D)
Other transportation and utilities.....	40-42,44-47	(D)	0	0	0	(D)	0	0
Trade.....	50-59	(S) 64	(D)	(D)	0	0	0	(D)
Finance, insurance, and real estate.....	60-65,67	(D)	0	0	0	0	0	(D)
Services.....	701,72,73,75-81, 83,84,87,89	4,889	2,415	217	406	(D)	(D)	(D)
Business services.....	73	540	401	(D)	(S) 68	(D)	0	(D)
Computer and data processing services.....	737	(D)	(D)	(D)	(S) 68	(D)	0	(D)
Other business services.....	731-736,738	(D)	(D)	(D)	0	0	0	0

See explanatory information and SOURCE at end of table.

Table A-14. Federal funds for industrial R&D performance, by industry and by size of company: 1998

Page 3 of 3

Industry	SIC code	Total	Size of company					
			Fewer than 500 employees	500 to 999 employees	1,000 to 4,999 employees	5,000 to 9,999 employees	10,000 to 24,999 employees	25,000 or more employees
[In millions of dollars]								
Health services.....	80	33	(D)	(D)	0	0	(D)	0
Offices and clinics of medical doctors, hospitals, medical and dental labs.....	801,806,807	21	(D)	(D)	0	0	(D)	0
Other health services.....	802-805,808-809	12	12	0	0	0	0	0
Engineering and management services.....	87	(S) 3,652	1,320	177	(D)	(D)	(D)	(D)
Engineering, architectural, and surveying.....	871	1,190	507	(D)	(D)	(D)	(D)	0
Research, development, and testing.....	873	(S) 2,388	741	(D)	0	0	0	(D)
Other engineering and management services.....	872,874	74	72	0	(D)	(D)	0	0
Other services.....	701,72,75-79,81, 83,84,89	663	(D)	0	(D)	0	(D)	0
Other nonmanufacturing industries ¹	07-12,14,15, 161-162,17	532	(D)	0	(D)	(D)	0	0

¹ Manufacturing companies with fewer than 50 employees and nonmanufacturing companies with fewer than 15 employees were sampled separately without regard to industry classification to minimize year-to-year variation in survey estimates. Estimates for manufacturing companies in this group are combined with those for companies in "Other manufacturing industries." Estimates for nonmanufacturing companies in this group are combined with those for companies in "Other nonmanufacturing industries."

KEY: (D) = Data have been withheld to avoid disclosing operations of individual companies.

(S) = Indicates imputation of more than 50 percent.

SOURCE: National Science Foundation/Division of Science Resources Studies, Survey of Industrial Research and Development: 1998

Table A-15. Federal funds for industrial R&D performance, by selected agency and by selected industry for selected years: 1979-98

Page 1 of 2

Industry	SIC code	1979	1981	1983	1985	1987	1989 ³	1991 ^{3,4}	1993 ⁴	1995 ⁴	1997 ⁴	1998 ⁴
[In millions of dollars]												
All agencies ⁴		12,518	16,382	20,680	27,196	30,752	28,554	26,372	22,809	23,451	23,928	24,164
Chemicals and allied products.....	28	346	421	393	230	190	126	209	(D)	(S) 210	(D)	(S) 483
Machinery.....	35	(T)	694	1,116	1,495	(D)	(D)	1,055	88	(D)	(D)	73
Electrical equipment.....	36	3,309	3,920	4,523	5,161	5,399	3,743	4,550	1,402	1,690	1,839	1,613
Motor vehicles and other												
transportation equipment.....	371,373-75,379	(T)	(T)	(T)	(T)	(D)	(D)	(D)	(D)	1,632	989	
Aircraft and missiles.....	372,376	5,840	8,528	11,396	16,582	18,519	16,828	11,096	9,369	11,462	10,619	9,341
Other industries ¹	--	(T)	(T)	(T)	(T)	(T)	(T)	(D)	9,491	8,333	9,180	11,666
DoD												
Total.....		7,939	10,540	14,571	20,948	22,252	(S)	(S)	(S)	(S) 13,876	(S) 12,603	13,709
Chemicals and allied products.....	28	36	40	48	(S)	(D)	(S)	(D)	(D)	(S) 139	(D)	(D)
Machinery.....	35	541	599	963	1,287	(D)	(D)	748	58	(S) 47	(D)	(D)
Electrical equipment.....	36	1,920	2,338	3,057	3,812	(S)	2,229	(S)	(D)	(S) 1,442	1,565	(S) 1,274
Motor vehicles and other												
transportation equipment.....	371,373-75,379	(T)	(T)	(T)	(D)	(D)	(D)	(D)	888	1,199	(S) 1,166	318
Aircraft and missiles.....	372,376	4,210	6,121	8,888	13,918	13,717	(S)	(S)	(S)	(S) 6,631	(S) 4,989	(S) 4,655
Other industries ¹	--	(T)	(T)	(T)	(D)	(D)	(D)	(D)	5,707	4,418	4,637	7,322
NASA												
Total.....		1,786	2,306	2,150	(S)	2,805	(S)	(S)	435	(S) 2,054	(S) 2,022	(S) 1,522
Chemicals and allied products.....	28	(T)	(T)	(T)	(S)	(D)	0	(S)	2	4	(D)	(D)
Machinery.....	35	74	81	(T)	(D)	(D)	(D)	(D)	2	(S) 1	(S) 0	
Electrical equipment.....	36	252	317	188	90	115	(D)	(S)	(D)	(S) 145	(S) 130	
Motor vehicles and other												
transportation equipment.....	371,373-75,379	(T)	(T)	(T)	(T)	(D)	(D)	(D)	20	(D)	(D)	(D)
Aircraft and missiles.....	372,376	1,221	1,785	1,959	(S)	2,650	(S)	(S)	236	(S) 985	(S) 1,060	(S) 926
Other industries ¹	--	119	70	(T)	(D)	(D)	(D)	(D)	137	946	708	341

See explanatory information and SOURCE at end of table.

Table A-15. Federal funds for industrial R&D performance, by selected agency and by selected industry for selected years: 1979-98

Page 2 of 2

Industry	SIC code	1979	1981	1983	1985	1987	1989 ³	1991 ^{3,4}	1993 ⁴	1995 ⁴	1997 ⁴	1998 ⁴
[In millions of dollars]												
DOE												
Total.....		1,575	1,976	1,949	2,901	2,968	3,221	(S)	(S)	(S) 3,547	(S) 2,505	(S) 1,998
Chemicals and allied products.....	28	(T)	(T)	(T)	(S)	171	(S)	(S)	(D)	40	(D)	(D)
Machinery.....	35	(T)	(T)	(T)	(S)	(D)	(S)	(D)	(S)	31	38	37
Electrical equipment.....	36	784	951	917	1,188	1,184	1,353	(S)	57	72	42	(D)
Motor vehicles and other transportation equipment.....	371,373-75,379	16	20	(T)	(T)	(D)	(D)	(D)	(D)	0	(D)	(D)
Aircraft and missiles.....	372,376	253	340	207	468	688	(S)	(S)	(S)	(S) 2,498	(S) 1,307	(S) 1,145
Other industries ¹	-	287	356	(T)	(T)	(D)	(D)	(D)	1,197	906	970	687

¹ Beginning in 1996 manufacturing companies with fewer than 50 employees and nonmanufacturing companies with fewer than 15 employees were sampled separately without regard to industry classification to minimize year-to-year variation in survey estimates. Estimates for all companies in this group are combined with those for companies in "Other industries." As a result, statistics for "Other industries" after 1995 are not comparable with statistics for prior years.

² Funds for 1987-97 are based on all companies reporting Federal R&D funds.

³ As a result of a new sample design, statistics for 1989 and 1991 have been revised since originally published. These statistics now better reflect R&D performance among firms in the nonmanufacturing industries and small firms in all industries. See the technical notes for more information.

⁴ As a result of the new sample design, statistics for 1991 and later years are not directly comparable with statistics for 1990 and earlier years.

KEY: (D) = Data have been withheld to avoid disclosing operations of individual companies.

(S) = Indicates imputation of more than 50 percent. For years prior to 1995, data have been withheld.

(T) = Not separately available but included in the total.

NOTES: Data for DoD, NASA, and DOE do not sum to the totals because the data reported by all other Federal agencies are included in the totals but not shown separately. In addition, Federal R&D data collected on the Form RD-1A is not allocated by agency type.

SOURCE: National Science Foundation/Division of Science Resources Studies, Survey of Industrial Research and Development: 1998

Table A-16. Total number of R&D-performing companies and number reporting Federal R&D funds, by industry and by size of company: 1998

Page 1 of 3

Industry	SIC code	Size of company													
		Total		Fewer than 500 employees		500 to 999 employees		1,000 to 4,999 employees		5,000 to 9,999 employees		10,000 to 24,999 employees		25,000 or more employees	
		Total	Federal	Total	Federal	Total	Federal	Total	Federal	Total	Federal	Total	Federal	Total	Federal
All industries.....		41,923	2,906	38,921	2,734	1,158	42	1,244	37	288	31	183	22	128	39
Manufacturing.....		20,808	673	18,731	551	731	28	918	23	227	24	132	18	71	29
Food, kindred, and tobacco products.....	20,21	490	0	322	0	53	0	70	0	20	0	13	0	12	0
Textiles and apparel.....	22,23	138	1	51	0	39	0	31	0	7	0	7	0	2	1
Lumber, wood products, and furniture.....	24,25	271	52	216	50	13	1	27	1	11	0	5	0	0	0
Paper and allied products.....	26	285	2	201	0	20	0	39	0	11	0	8	0	6	2
Chemicals and allied products.....	28	706	63	506	51	73	0	81	5	27	3	14	3	5	1
Industrial chemicals.....	281-82,286	149	58	52	49	52	0	27	2	11	3	6	3	1	1
Drugs and medicines.....	283	151	4	109	2	3	0	25	2	5	0	6	0	3	0
Other chemicals.....	284-85,287-89	406	1	345	0	18	0	29	1	11	0	2	0	1	0
Petroleum refining and extraction.....	13,29	126	4	98	0	2	0	5	0	8	0	9	3	3	1
Rubber products.....	30	768	1	613	0	69	0	68	0	11	1	4	0	3	0
Stone, clay, and glass products.....	32	232	2	198	0	4	0	13	1	12	0	5	1	0	0
Primary metals.....	33	158	8	61	1	22	1	50	0	16	3	6	1	3	2
Ferrous metals and products.....	331-32,3398-99	107	5	54	0	2	0	33	0	13	3	4	1	1	1
Nonferrous metals and products.....	333-36	51	3	7	1	20	1	17	0	3	0	2	0	2	1
Fabricated metal products.....	34	1,136	28	973	24	80	1	58	1	12	1	9	0	4	1
Machinery.....	35	1,883	80	1,563	70	147	0	126	2	26	3	18	4	3	1
Office, computing, and accounting machines.....	357	136	18	86	16	22	0	16	1	6	1	5	0	1	0
Other machinery, except electrical.....	351-56,358-59	1,747	61	1,477	53	125	0	110	1	20	2	13	4	2	1
Electrical equipment.....	36	1,124	91	858	61	96	12	125	6	22	4	14	3	9	5
Radio and TV receiving equipment....	365	15	0	11	0	1	0	3	0	0	0	0	0	0	0
Communication equipment.....	366	103	7	65	2	12	0	17	2	5	1	0	0	4	2
Electronic components.....	367	600	25	467	6	52	10	64	4	10	1	5	3	1	0
Other electrical equipment.....	361-64,369	406	59	314	52	31	2	41	0	7	2	9	0	4	3

See explanatory information and SOURCE at end of table.

Table A-16. Total number of R&D-performing companies and number reporting Federal R&D funds, by industry and by size of company: 1998

Page 2 of 3

Industry	SIC code	Size of company													
		Total		Fewer than 500 employees		500 to 999 employees		1,000 to 4,999 employees		5,000 to 9,999 employees		10,000 to 24,999 employees		25,000 or more employees	
		Total	Federal	Total	Federal	Total	Federal	Total	Federal	Total	Federal	Total	Federal	Total	Federal
Transportation equipment.....	37	542	23	387	2	3	1	109	2	21	5	7	1	14	12
Motor vehicles and motor vehicles equipment.....	371	316	5	190	0	1	0	99	1	14	1	6	0	5	3
Other transportation equipment.....	373-75,379	203	2	195	0	1	0	4	0	1	0	0	0	2	2
Aircraft and missiles.....	372,376	23	16	2	2	1	1	6	1	6	4	1	1	7	7
Professional and scientific instruments...	38	655	26	498	8	63	5	72	5	13	3	5	2	4	3
Scientific and mechanical measuring instruments.....	381-82	355	17	286	6	33	4	27	2	4	1	3	2	2	2
Optical, surgical, photographic, and other instruments.....	384-87	299	9	211	2	30	1	45	3	9	2	2	0	2	1
Other manufacturing industries ¹	27,31,39	12,295	292	12,186	285	47	6	42	0	9	1	7	0	3	0
Nonmanufacturing.....		21,115	2,233	20,191	2,183	428	14	327	14	61	7	52	4	57	10
Transportation and utilities.....	40-42,44-49	324	8	176	0	60	1	41	1	18	2	13	0	16	4
Communications.....	48	113	4	100	0	1	0	2	1	0	0	1	0	9	3
Telephone communications.....	481	60	2	51	0	0	0	0	0	0	0	1	0	8	2
Other communications.....	482-484,489	53	2	49	0	1	0	2	1	0	0	0	0	1	1
Electric, gas, and sanitary services....	49	110	4	4	0	54	1	27	0	16	2	9	0	1	1
Other transportation and utilities.....	40-42,44-47	101	0	72	0	6	0	12	0	2	0	3	0	6	0
Trade.....	50-59	3,752	7	3,368	2	222	3	127	0	8	0	6	0	21	2
Finance, insurance, and real estate.....	60-65,67	392	1	332	0	7	0	31	0	6	0	9	0	8	1
Services.....	701,72,73,75-81, 83,84,87,89	6,170	1,014	5,886	982	117	10	113	11	20	4	23	4	11	3
Business services.....	73	3,448	307	3,279	294	76	3	65	7	13	1	8	0	8	2
Computer and data processing services.....	737	3,069	305	2,924	293	72	2	53	7	10	1	5	0	4	2
Other business services.....	731-736,738	380	2	354	1	4	1	11	0	3	0	3	0	4	0

See explanatory information and SOURCE at end of table.

Table A-16. Total number of R&D-performing companies and number reporting Federal R&D funds, by industry and by size of company: 1998

Page 3 of 3

Industry	SIC code	Size of company													
		Total		Fewer than 500 employees		500 to 999 employees		1,000 to 4,999 employees		5,000 to 9,999 employees		10,000 to 24,999 employees		25,000 or more employees	
		Total	Federal	Total	Federal	Total	Federal	Total	Federal	Total	Federal	Total	Federal	Total	Federal
Health services.....	80	482	62	475	61	1	0	3	0	1	0	2	1	0	0
Offices and clinics of medical doctors, hospitals, medical, and dental labs.....	801,806,807	365	52	361	51	1	0	1	0	0	0	2	1	0	0
Other health services.....	802-805,808-809	118	11	115	11	0	0	2	0	1	0	0	0	0	0
Engineering and management services.....	87	1,776	592	1,704	575	36	7	26	4	4	3	4	2	2	1
Engineering, architectural, and surveying.....	871	491	206	453	195	13	5	20	3	2	1	3	2	0	0
Research, development, and testing.....	873	940	308	930	305	8	2	1	0	0	0	0	0	1	1
Other engineering and management services.....	872,874	345	78	321	75	14	0	5	1	2	2	1	0	1	0
Other services.....	701,72,75-79,81, 83,84,89	464	53	428	52	4	0	20	0	2	0	9	1	1	0
Other nonmanufacturing industries'	07-12,14,15, 161-162,17	10,477	1,203	10,429	1,200	22	0	15	2	9	1	1	0	1	0

¹ Manufacturing companies with fewer than 50 employees and nonmanufacturing companies with fewer than 15 employees were sampled separately without regard to industry classification to minimize year-to-year variation in survey estimates. Estimates for manufacturing companies in this group are combined with those for companies in "Other manufacturing industries." Estimates for nonmanufacturing companies in this group are combined with those for companies in "Other nonmanufacturing industries."

SOURCE: National Science Foundation/Division of Science Resources Studies, Survey of Industrial Research and Development: 1998

Table A-17. Industry-administered federally funded R&D centers (FFRDC's)—R&D funds by character of work, full-time-equivalent (FTE) R&D scientists and engineers, and total number of employees: 1988–98

Item	1988 ³	1989 ³	1990 ³	1991 ^{3, 4}	1992 ⁴	1993 ⁴	1994 ⁴	1995 ⁴	1996 ⁴	1997 ⁴	1998 ⁴
[In millions of dollars]											
Total R&D funds.....	2,122	2,195	2,323	2,277	2,353	1,965	2,202	2,273	2,297	2,130	2,078
Basic research.....	337	398	499	461	474	492	503	530	708	625	568
Applied research.....	371	374	386	433	507	435	503	535	231	213	230
Development.....	1,414	1,423	1,438	1,383	1,373	1,039	1,196	1,209	1,358	1,261	1,280
[Employment]											
Number of FTE R&D scientists and engineers ¹	10,994	11,618	12,438	11,977	11,770	8,083	8,362	9,033	8,696	8,324	7,784
Total employment ²	36,143	35,716	42,153	39,697	40,755	23,930	23,905	24,031	21,735	20,391	20,306

¹ These data were recorded in January of the year following the year indicated.

² These data were recorded in March of the year indicated.

³ As a result of a new sample design, statistics for 1988–91 have been revised since originally published. These statistics now better reflect R&D performance among firms in the nonmanufacturing industries and small firms in all industries. See the technical notes for more information.

⁴ As a result of the new sample design, statistics for 1991 and later years are not directly comparable with statistics for 1990 and earlier years.

NOTE: Industry-administered federally funded research and development centers (FFRDCs) conduct R&D almost exclusively for use by the Federal Government. Data for these FFRDCs administered by industry are included in Federal R&D support shown in other tables under the industry classifications of the administering firms. See section B for a listing of industry-administered FFRDCs and their locations.

SOURCE: National Science Foundation/Division of Science Resources Studies, Survey of Industrial Research and Development: 1998

Table A-18. Total (company, Federal, and other) funds for industrial R&D performance and number of R&D-performing companies in manufacturing and nonmanufacturing industries, by size of company: 1998

Size of company [Number of employees]	Total	Manufacturing	Nonmanufacturing
	Funds for industrial R&D		
	[In millions of dollars]		
Total.....	169,180	120,401	48,780
Fewer than 500.....	30,175	9,404	20,771
500 to 999.....	5,495	2,916	2,580
1,000 to 4,999.....	21,525	15,636	5,889
5,000 to 9,999.....	14,053	11,398	2,654
10,000 to 24,999.....	24,876	18,729	6,147
25,000 or more.....	73,055	62,317	10,738
Number of R&D-performing companies			
Total.....	41,923	20,808	21,115
Fewer than 500.....	38,921	18,731	20,191
500 to 999.....	1,158	731	428
1,000 to 4,999.....	1,244	918	327
5,000 to 9,999.....	288	227	61
10,000 to 24,999.....	183	132	52
25,000 or more.....	128	71	57

SOURCE: National Science Foundation/Division of Science Resources Studies, Survey of Industrial Research and Development: 1998

Table A-19. Concentration of total, Federal, and company and other industrial R&D funds and net sales of R&D-performing companies, ranked by size of R&D program: 1988–98

Companies ranked by size of R&D program	1988 ¹	1989 ¹	1990 ¹	1991 ^{1,2}	1992 ²	1993 ²	1994 ²	1995 ²	1996 ²	1997 ²	1998 ²
Percent of total (company, Federal, and other) R&D funds											
First 4 (1–4).....	18	19	18	16	15	17	15	16	15	14	12
Next 4 (5–8).....	12	13	13	8	8	7	8	8	8	8	8
Next 12 (9–20).....	17	16	15	12	13	13	14	13	13	13	13
Next 20 (21–40).....	12	12	12	11	11	12	13	12	12	11	11
Next 60 (41–100).....	15	15	16	15	15	16	15	14	14	14	13
Next 100 (101–200).....	8	8	9	12	12	8	9	8	9	9	9
Next 200 (201–400).....	7	6	7	6	6	7	7	7	7	8	8
Percent of Federal R&D funds											
First 4 (1–4).....	31	36	38	14	11	23	26	35	37	40	46
Next 4 (5–8).....	18	15	16	21	18	17	19	19	20	23	17
Next 12 (9–20).....	27	30	26	21	27	32	32	27	23	18	14
Next 20 (21–40).....	15	11	12	15	13	16	13	8	7	7	7
Next 60 (41–100).....	6	6	6	13	11	5	7	5	5	5	7
Next 100 (101–200).....	3	1	1	3	4	5	2	3	4	3	5
Next 200 (201–400).....	0	0	0	2	2	2	1	3	4	4	4
Percent of company and other (except Federal) R&D funds											
First 4 (1–4).....	21	22	21	17	17	17	16	16	15	13	12
Next 4 (5–8).....	7	7	7	7	8	7	7	7	7	7	7
Next 12 (9–20).....	12	13	12	10	12	12	12	11	11	11	12
Next 20 (21–40).....	12	12	13	10	11	11	11	11	10	11	10
Next 60 (41–100).....	16	16	17	16	17	14	14	14	14	13	13
Next 100 (101–200).....	10	10	10	15	14	9	9	9	10	10	10
Next 200 (201–400).....	8	8	8	7	7	8	8	8	8	9	8
Percent of net sales ranked by size of total R&D funds											
First 4 (1–4).....	7	6	8	7	8	8	8	8	6	6	5
Next 4 (5–8).....	5	5	4	3	3	3	2	2	3	2	3
Next 12 (9–20).....	5	5	5	4	4	4	5	6	6	5	5
Next 20 (21–40).....	6	5	5	4	4	4	5	4	4	5	5
Next 60 (41–100).....	11	12	12	12	12	11	10	9	8	7	8
Next 100 (101–200).....	9	8	9	9	9	8	8	8	11	8	8
Next 200 (201–400).....	10	11	12	11	11	10	10	10	11	13	11

¹ As a result of a new sample design, statistics for 1988–91 have been revised since originally published. These statistics now better reflect R&D performance among firms in the nonmanufacturing industries and small firms in all industries.

² As a result of the new sample design, statistics for 1991 and later years are not directly comparable with statistics for 1990 and earlier years. See the technical notes for more information.

NOTES: Companies were ranked individually for each year; therefore, particular companies comprising the size groups may have changed from year to year.

SOURCE: National Science Foundation/Division of Science Resources Studies, Survey of Industrial Research and Development: 1998

Table A-20. Domestic net sales of R&D-performing companies, by industry and by size of company: 1997–98

Page 1 of 6

Industry	SIC Code	Total	Size of company							
			Fewer than 500 employees	500 to 900 employees	1,000 to 4,999 employees	5,000 to 9,999 employees	10,000 to 24,999 employees	25,000 or more employees		
[In millions of dollars]										
1997										
All industries.....		4,573,376	383,693	164,954	730,532	579,895	839,149	1,875,152		
Manufacturing.....		3,084,508	251,504	138,267	534,768	348,135	627,198	1,184,636		
Food, kindred, and tobacco products.....	20,21	363,454	16,182	21,131	54,019	44,600	80,506	147,015		
Textiles and apparel.....	22,23	50,725	5,703	3,953	13,939	(D)	14,880	(D)		
Lumber, wood products, and furniture.....	24,25	40,866	3,752	4,874	11,246	12,075	8,920	0		
Paper and allied products.....	26	134,028	(D)	(D)	21,084	10,439	41,537	56,961		
Chemicals and allied products.....	28	349,944	18,911	9,519	72,441	69,419	94,026	85,627		
Industrial chemicals.....	281-82,286	142,139	4,868	(D)	34,394	31,571	36,129	(D)		
Drugs and medicines.....	283	110,054	3,681	643	16,007	17,871	36,120	35,732		
Other chemicals.....	284-85,287-89	97,751	10,363	(D)	22,040	19,977	21,777	(D)		
Petroleum refining and extraction.....	13,29	282,521	230	1,767	96,006	0	107,154	77,365		
Rubber products.....	30	99,225	40,494	7,945	24,071	(D)	7,492	(D)		
Stone, clay, and glass products.....	32	32,914	(D)	(D)	5,376	6,559	17,692	0		
Primary metals.....	33	133,940	5,937	18,118	23,200	21,734	30,752	34,199		
Ferrous metals and products.....	331-32,3398-99	72,704	668	245	9,980	17,755	(D)	(D)		
Nonferrous metals and products.....	333-36	61,237	5,269	17,873	13,220	3,979	(D)	(D)		
Fabricated metal products.....	34	109,918	19,213	(D)	23,368	14,086	30,142	(D)		
Machinery.....	35	327,764	37,523	15,445	65,741	54,395	71,441	83,220		
Office, computing, and accounting machines.....	357	139,516	6,977	2,068	15,456	24,264	(D)	(D)		
Other machinery, except electrical.....	351-56,358-59	188,248	30,546	13,377	50,285	30,131	(D)	(D)		
Electrical equipment.....	36	397,253	28,704	16,196	66,144	62,265	47,129	176,815		
Radio and TV receiving equipment.....	365	5,896	(D)	(D)	4,164	0	0	0		
Communication equipment.....	366	92,058	8,134	(D)	11,670	33,750	0	(D)		
Electronic components.....	367	132,461	(D)	5,708	23,625	21,217	25,467	(D)		
Other electrical equipment.....	361-64,369	166,838	5,380	6,760	26,685	7,298	21,662	99,053		

See explanatory information and SOURCE at end of table.

Table A-20. Domestic net sales of R&D-performing companies, by industry and by size of company: 1997–98

Page 2 of 6

Industry	SIC Code	Total	Size of company							
			Fewer than 500 employees	500 to 900 employees	1,000 to 4,999 employees	5,000 to 9,999 employees	10,000 to 24,999 employees	25,000 or more employees		
[In millions of dollars]										
1997										
Transportation equipment.....	37	516,738	7,829	13,846	12,106	18,329	50,569	414,060		
Motor vehicles and motor vehicles equipment.....	371	357,701	(D)	13,415	5,180	(D)	44,553	(D)		
Other transportation equipment.....	373–75,379	14,141	0	(D)	1,405	(D)	(D)	(D)		
Aircraft and missiles.....	372,376	144,896	(D)	(D)	5,521	6,612	(D)	128,270		
Professional and scientific instruments.....	38	115,938	13,350	7,552	27,986	11,802	7,410	47,839		
Scientific and mechanical measuring instruments.....	381–82	57,158	9,294	4,628	9,730	4,591	(D)	(D)		
Optical, surgical, photographic, and other instruments.....	384–87	58,781	4,056	2,924	18,256	7,211	(D)	(D)		
Other manufacturing industries ¹	27,31,39	129,277	48,438	6,914	18,042	13,506	17,549	24,827		
Nonmanufacturing		1,488,869	132,189	26,688	195,764	231,761	211,951	690,517		
Transportation and utilities.....	40–42,44–49	661,667	2,944	488	66,140	122,019	71,882	398,195		
Communications.....	48	278,724	926	(D)	1,568	72,524	0	(D)		
Telephone communications.....	481	270,988	0	0	0	72,524	0	198,463		
Other communications.....	482–484,489	7,737	926	(D)	1,568	0	0	(D)		
Electric, gas, and sanitary services.....	49	188,859	788	(D)	59,399	(D)	(D)	(D)		
Other transportation and utilities.....	40–42,44–47	194,084	1,230	(D)	5,173	(D)	(D)	181,615		
Trade.....	50–59	331,046	68,434	4,034	47,493	49,877	55,380	105,828		
Finance, insurance, and real estate.....	60–65,67	226,679	3,403	4,202	29,748	19,579	14,182	155,565		
Services.....	701,72,73,75–81, 83,84,87,89	216,994	45,194	17,004	43,889	16,847	(D)	(D)		
Business services.....	73	106,900	25,892	7,869	23,221	11,742	14,985	23,191		
Computer and data processing services.....	737	85,170	24,721	6,791	20,425	(D)	(D)	12,936		
Other business services.....	731–736,738	21,730	1,172	1,078	2,796	(D)	(D)	10,255		

See explanatory information and SOURCE at end of table.

Table A-20. Domestic net sales of R&D-performing companies, by industry and by size of company: 1997–98

Page 3 of 6

Industry	SIC Code	Total	Size of company							
			Fewer than 500 employees	500 to 900 employees	1,000 to 4,999 employees	5,000 to 9,999 employees	10,000 to 24,999 employees	25,000 or more employees		
[In millions of dollars]										
1997										
Health services.....	80	13,039	1,422	641	3,059	0	(S) 7,918	0		
Offices and clinics of medical doctors , hospitals, medical, and dental labs.....	801,806,807	11,983	1,180	641	2,244	0	(S) 7,918	0		
Other health services.....	802-805,808-809	1,056	242	0	815	0	0	0		
Engineering and management services.....	87	54,588	14,890	4,985	8,143	(D)	20,425	(D)		
Engineering, architectural, and surveying.....	871	29,944	6,446	1,473	6,309	(D)	(D)	0		
Research, development, and testing.....	873	12,407	7,190	1,765	370	(D)	0	(D)		
Other engineering and management services.....	872,874	12,237	1,254	1,746	1,465	(D)	(D)	0		
Other services.....	701,72,75-79,81, 83,84,89	42,466	2,990	3,510	9,466	(D)	(D)	0		
Other nonmanufacturing industries ¹	07-12,14,15, 161-162,17	52,482	12,213	960	8,493	23,439	(D)	(D)		

See explanatory information and SOURCE at end of table.

Table A-20. Domestic net sales of R&D-performing companies, by industry and by size of company: 1997-98

Page 4 of 6

Industry	SIC Code	Total	Size of company							
			Fewer than 500 employees	500 to 900 employees	1,000 to 4,999 employees	5,000 to 9,999 employees	10,000 to 24,999 employees	25,000 or more employees		
[In millions of dollars]										
1998										
All industries.....		4,683,335	366,082	170,667	702,629	746,481	896,445	1,801,030		
Manufacturing.....		3,221,047	245,231	99,537	482,719	617,767	614,536	1,161,257		
Food, kindred, and tobacco products.....	20,21	386,826	14,142	11,358	53,111	72,373	74,493	161,349		
Textiles and apparel.....	22,23	48,530	3,391	(D)	10,831	6,108	14,678	(D)		
Lumber, wood products, and furniture.....	24,25	43,577	4,276	1,405	10,720	16,353	10,822	0		
Paper and allied products.....	26	153,439	5,516	3,424	34,986	14,979	37,647	56,888		
Chemicals and allied products.....	28	332,962	17,765	13,998	63,885	67,513	86,510	83,291		
Industrial chemicals.....	281-82,286	126,217	7,643	11,150	23,205	27,264	(D)	(D)		
Drugs and medicines.....	283	118,384	2,392	722	18,243	15,714	42,898	38,416		
Other chemicals.....	284-85,287-89	88,361	7,730	2,126	22,437	24,535	(D)	(D)		
Petroleum refining and extraction.....	13,29	222,246	4,241	(D)	(D)	20,504	109,372	59,367		
Rubber products.....	30	77,827	18,145	5,858	19,705	13,906	5,009	15,203		
Stone, clay, and glass products.....	32	42,323	2,945	609	(D)	16,141	17,588	(D)		
Primary metals.....	33	120,866	3,920	5,425	25,579	23,120	22,176	40,646		
Ferrous metals and products.....	331-32,3398-99	79,250	3,255	154	12,933	20,903	(D)	(D)		
Nonferrous metals and products.....	333-36	41,616	665	5,271	12,646	2,217	(D)	(D)		
Fabricated metal products.....	34	110,032	20,645	8,242	15,351	15,404	25,210	25,180		
Machinery.....	35	290,550	40,639	17,643	62,058	42,906	75,618	51,686		
Office, computing, and accounting machines.....	357	96,243	4,918	3,572	17,284	13,839	(D)	(D)		
Other machinery, except electrical.....	351-56,358-59	194,307	35,721	14,071	44,773	29,067	(D)	(D)		
Electrical equipment.....	36	367,413	27,215	12,360	52,503	43,508	57,719	174,107		
Radio and TV receiving equipment.....	365	5,368	(D)	(D)	4,315	0	0	0		
Communication equipment.....	366	91,060	8,918	(D)	10,429	(S) 12,290	0	(D)		
Electronic components.....	367	115,813	(D)	6,343	23,317	24,722	(S) 24,722	(D)		
Other electrical equipment.....	361-64,369	155,171	6,476	3,927	14,442	6,496	32,997	90,834		

See explanatory information and SOURCE at end of table.

Table A-20. Domestic net sales of R&D-performing companies, by industry and by size of company: 1997–98

Page 5 of 6

Industry	SIC Code	Total	Size of company							
			Fewer than 500 employees	500 to 900 employees	1,000 to 4,999 employees	5,000 to 9,999 employees	10,000 to 24,999 employees	25,000 or more employees		
[In millions of dollars]										
1998										
Transportation equipment.....	37	773,242	7,561	(S) 342	59,622	234,998	49,629	421,091		
Motor vehicles and motor vehicles equipment.....	371	602,962	(D)	(D)	53,592	(D)	46,038	(D)		
Other transportation equipment.....	373-75,379	14,694	1,871	(D)	2,153	(D)	(D)	(D)		
Aircraft and missiles.....	372,376	155,587	(D)	(D)	3,877	9,540	(D)	138,400		
Professional and scientific instruments.....	38	120,884	10,985	6,802	26,290	16,838	11,572	48,398		
Scientific and mechanical measuring instruments.....	381-82	55,323	7,448	3,848	7,976	4,962	(D)	(D)		
Optical, surgical, photographic, and other instruments.....	384-87	65,561	3,537	2,954	18,313	11,876	(D)	(D)		
Other manufacturing industries ¹	27,31,39	130,331	63,845	8,957	15,063	13,116	16,493	12,857		
Nonmanufacturing		1,462,288	120,850	71,131	219,911	128,714	281,910	639,773		
Transportation and utilities.....	40-42,44-49	463,831	1,461	12,331	46,822	60,184	79,340	263,694		
Communications.....	48	204,176	718	(D)	(D)	(D)	(D)	(D)		
Telephone communications.....	481	193,577	18	0	0	(D)	(D)	189,402		
Other communications.....	482-484,489	10,599	700	(D)	(D)	0	0	(D)		
Electric, gas, and sanitary services.....	49	184,188	107	(D)	39,528	57,183	65,941	(D)		
Other transportation and utilities.....	40-42,44-47	75,468	635	1,804	(D)	(D)	(D)	55,392		
Trade.....	50-59	313,750	40,703	37,908	38,507	21,358	32,556	142,717		
Finance, insurance, and real estate.....	60-65,67	370,659	10,399	1,383	80,941	13,514	80,912	183,510		
Services.....	701,72,73,75-81, 83,84,87,89	265,855	52,586	17,275	46,851	18,555	(D)	(D)		
Business services.....	73	142,201	31,190	10,110	28,512	13,042	26,171	33,175		
Computer and data processing services.....	737	114,926	27,138	9,644	25,514	10,308	17,320	25,002		
Other business services.....	731-736,738	27,275	4,052	466	2,998	2,735	8,851	8,173		

See explanatory information and SOURCE at end of table.

Table A-20. Domestic net sales of R&D-performing companies, by industry and by size of company: 1997–98

Page 6 of 6

Industry	SIC Code	Total	Size of company							
			Fewer than 500 employees	500 to 900 employees	1,000 to 4,999 employees	5,000 to 9,999 employees	10,000 to 24,999 employees	25,000 or more employees		
[In millions of dollars]										
1998										
Health services.....	80	13,961	2,633	(D)	742	(D)	(D)	0		
Offices and clinics of medical doctors, hospitals, medical and dental labs.....	801,806,807	12,292	1,927	(D)	(D)	0	(D)	0		
Other health services.....	802-805,808-809	1,669	706	0	(D)	(D)	0	0		
Engineering and management services.....	87	61,185	15,439	5,221	9,671	(D)	17,874	(D)		
Engineering, architectural, and surveying.....	871	31,378	5,186	1,472	6,726	(D)	(D)	0		
Research, development, and testing.....	873	13,340	7,536	2,106	(D)	0	0	(D)		
Other engineering and management services.....	872,874	16,467	2,718	1,643	(D)	(D)	(D)	5,175		
Other services.....	701,72,75-79,81, 83,84,89	48,508	3,324	(D)	7,926	(D)	(D)	(D)		
Other nonmanufacturing industries ¹	07-12,14,15, 161-162,17	48,193	15,701	2,234	6,790	15,103	(D)	(D)		

¹ Manufacturing companies with fewer than 50 employees and nonmanufacturing companies with fewer than 15 employees were sampled separately without regard to industry classification to minimize year-to-year variation in survey estimates. Estimates for manufacturing companies in this group are combined with those for companies in "Other manufacturing industries."

KEY: (D) = Data have been withheld to avoid disclosing operations of individual companies.

(S) = Indicates imputation of more than 50 percent.

SOURCE: National Science Foundation/Division of Science Resources Studies, Survey of Industrial Research and Development: 1998

**Table A-21. Total (company, Federal, and other) industrial R&D funds as a percent of net sales in R&D- performing companies,
by industry and by size of company: 1988–98**

Page 1 of 3

Industry and size of company	SIC code	1988 ³	1989 ³	1990 ³	1991 ^{3,4}	1992 ⁴	1993 ⁴	1994 ⁴	1995 ⁴	1996 ⁴	1997 ⁴	1998 ⁴
[Percent]												
Distribution by industry:												
All industries ¹		NA	NA	NA	NA	NA	NA	NA	3.4	3.5	3.4	3.6
Manufacturing.....		4.5	4.3	4.2	4.2	4.2	3.8	3.6	3.6	4.0	3.9	3.7
Food, kindred, and tobacco products.....	20,21	(D)	(D)	(D)	0.5	0.5	0.5	0.5	0.5	0.4	0.5	0.4
Textiles and apparel.....	22,23	(D)	(D)	(D)	(D)	0.6	(D)	(D)	(D)	(D)	(D)	(D)
Lumber, wood products, and furniture.....	24,25	(D)	0.6	0.6	(D)	(D)	(D)	(D)	(D)	(D)	0.9	0.9
Paper and allied products.....	26	(D)	0.8	1.0	1.1	(D)						
Chemicals and allied products.....	28	5.3	5.4	5.3	5.4	5.5	(D)	(D)	4.7	(D)	(D)	6.5
Industrial chemicals.....	281–82,286	4.4	4.2	4.5	4.6	4.6	(D)	(D)	(D)	(D)	(D)	(D)
Drugs and medicines.....	283	8.8	(D)	(D)	8.9	9.6	12.5	10.2	10.4	10.1	10.5	10.6
Other chemicals.....	284–85,287–89	3.4	(D)	(D)	3.1	2.7	(D)	(D)	(D)	2.7	(D)	(D)
Petroleum refining and extraction.....	13,29	1.0	0.9	0.9	1.0	0.9	0.9	0.8	0.7	0.7	(D)	0.8
Rubber products.....	30	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)
Stone, clay, and glass products.....	32	(D)	(D)	(D)	(D)	(D)	1.5	1.7	1.5	1.3	1.8	(D)
Primary metals.....	33	0.8	0.8	0.8	0.8	0.6	0.7	0.6	0.5	(D)	0.7	(D)
Ferrous metals and products.....	331–32,3398–99	0.5	(D)	(D)	(D)	(D)	0.5	(D)	(D)	(D)	(D)	(D)
Nonferrous metals and products.....	333–36	1.0	(D)	(D)	(D)	(D)	1.2	(D)	(D)	(D)	(D)	(D)
Fabricated metal products.....	34	1.3	1.5	1.4	1.5	1.5	1.4	1.2	1.1	(D)	1.6	1.4
Machinery.....	35	7.7	7.9	7.7	8.1	7.8	4.6	3.8	(D)	5.2	5.6	5.1
Office, computing, and accounting machines.....	357	(D)	(D)	(D)	(D)	(D)	9.9	7.9	(D)	(D)	9.2	9.3
Other machinery, except electrical.....	351–56,358–59	2.9	(D)	(D)	(D)	(D)	2.6	2.5	2.4	(D)	3.0	3.1
Electrical equipment.....	36	7.5	7.3	6.5	6.5	5.6	6.2	5.9	6.0	6.7	6.2	7.1
Radio and TV receiving equipment.....	365	2.4	1.8	1.6	(D)	(D)	(D)	(D)	(D)	(D)	(D)	2.9
Communication equipment.....	366	10.7	11.6	10.0	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)
Electronic components.....	367	9.0	(D)	8.3	7.9	7.5	8.1	7.5	(D)	(D)	(D)	(D)
Other electrical equipment.....	361–64,369	2.5	(D)	3.7	(D)	(D)	(D)	(D)	(D)	(D)	2.9	3.1
Transportation equipment.....	37	8.9	8.1	7.5	7.3	7.1	6.4	5.9	6.1	6.5	6.2	3.8
Motor vehicles and motor vehicles equipment.....	371	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)
Other transportation equipment.....	373–75,379	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)
Aircraft and missiles.....	372,376	16.3	13.5	11.8	12.1	11.8	12.5	13.8	12.9	12.9	11.2	9.3

See explanatory information and SOURCE at end of table.

**Table A-21. Total (company, Federal, and other) industrial R&D funds as a percent of net sales in R&D- performing companies,
by industry and by size of company: 1988–98**

Page 2 of 3

Industry and size of company	SIC code	1988 ³	1989 ³	1990 ³	1991 ^{3,4}	1992 ⁴	1993 ⁴	1994 ⁴	1995 ⁴	1996 ⁴	1997 ⁴	1998 ⁴
[Percent]												
Distribution by industry:												
Professional and scientific instruments.....	38	7.4	7.2	8.0	9.1	9.4	9.7	9.2	10.3	11.5	11.6	(D)
Scientific and mechanical measuring instruments.....	381–82	7.9	7.4	8.6	10.0	10.6	11.5	11.0	12.4	(D)	14.2	(D)
Optical, surgical, photographic, and other instruments.....	384–87	7.3	7.3	7.7	8.1	8.3	8.1	7.3	8.2	(D)	9.1	9.3
Other manufacturing industries ²	27,31,39	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	2.2	2.1
Nonmanufacturing ¹		NA	NA	NA	NA	NA	NA	NA	0.0	0.0	0.0	0.0
Transportation and Utilities.....	40–42,44–49	NA	NA	NA	NA	NA	NA	NA	1.2	1.0	0.5	(D)
Communications.....	48	NA	NA	NA	NA	NA	NA	NA	(D)	(D)	(D)	(D)
Telephone communications.....	481	NA	NA	NA	NA	NA	NA	NA	(D)	(D)	(D)	(D)
Other communications.....	482–484,489	NA	NA	NA	NA	NA	NA	NA	3.0	1.3	0.7	(D)
Electric, gas, and sanitary services.....	49	NA	NA	NA	NA	NA	NA	NA	0.3	0.2	(D)	(D)
Other transportation and utilities.....	40–42,44–47	NA	NA	NA	NA	NA	NA	NA	(D)	(D)	(D)	(D)
Trade.....	50–59	NA	NA	NA	NA	NA	NA	NA	(D)	2.3	(D)	3.6
Finance, insurance, and real estate.....	60–65,67	NA	NA	NA	NA	NA	NA	NA	(D)	(D)	(D)	(D)
Services.....	701,72,73,75–81, 83,84,87,89	NA	NA	NA	NA	NA	NA	NA	7.8	8.1	10.3	11.0
Business services.....	73	NA	NA	NA	NA	NA	NA	NA	10.1	10.2	11.2	10.7
Computer and data processing services.....	737	NA	NA	NA	NA	NA	NA	NA	11.8	(D)	13.7	(D)
Other business services.....	731–736,738	NA	NA	NA	NA	NA	NA	NA	1.6	(D)	1.2	(D)
Health services.....	80	NA	NA	NA	NA	NA	NA	NA	5.2	(D)	(D)	8.6
Offices and clinics of medical doctors, hospitals, medical and dental labs.....	801,806,807	NA	NA	NA	NA	NA	NA	NA	(D)	(S) 6.1	(D)	8.9
Other health services.....	802–805,808–809	NA	NA	NA	NA	NA	NA	NA	(D)	(D)	4.6	6.6
Engineering and management services.....	87	NA	NA	NA	NA	NA	NA	NA	7.8	9.7	17.0	19.3
Engineering, architectural, and surveying.....	871	NA	NA	NA	NA	NA	NA	NA	5.7	6.2	6.8	6.5

See explanatory information and SOURCE at end of table.

**Table A-21. Total (company, Federal, and other) industrial R&D funds as a percent of net sales in R&D- performing companies,
by industry and by size of company: 1988–98**

Page 3 of 3

Industry and size of company	SIC code	1988 ³	1989 ³	1990 ³	1991 ^{3,4}	1992 ⁴	1993 ⁴	1994 ⁴	1995 ⁴	1996 ⁴	1997 ⁴	1998 ⁴
[Percent]												
Distribution by industry:												
Research, development, and testing.....	873	NA	NA	NA	NA	NA	NA	NA	(D)	14.0	(D)	68.7
Other engineering and management services.....	872,874	NA	NA	NA	NA	NA	NA	NA	(D)	1.8	(D)	3.9
Other services.....	701,72,75–79,81, 83,84,89	NA	NA	NA	NA	NA	NA	NA	0.6	(D)	(D)	2.1
Other nonmanufacturing industries ²	07–12,14,15, 161–162,17	NA	NA	NA	NA	NA	NA	NA	0.8	(D)	3.1	7.9
Distribution by size of company: [Number of employees]												
Total ¹		NA	NA	NA	NA	NA	NA	NA	3.4	3.5	3.4	3.6
Fewer than 500.....		NA	NA	NA	NA	NA	NA	NA	4.4	6.0	6.3	8.2
500 to 999.....		NA	NA	NA	NA	NA	NA	NA	3.2	3.1	3.0	3.2
1,000 to 4,999.....		NA	NA	NA	NA	NA	NA	NA	2.8	3.0	2.7	3.1
5,000 to 9,999.....		NA	NA	NA	NA	NA	NA	NA	2.0	2.7	2.5	1.9
10,000 to 24,999.....		NA	NA	NA	NA	NA	NA	NA	2.3	2.5	2.6	2.8
25,000 or more.....		NA	NA	NA	NA	NA	NA	NA	4.3	4.0	3.9	4.1

¹ Beginning in 1995 this table included both manufacturing and nonmanufacturing companies. Only manufacturing companies were included in prior years.

² Beginning in 1996 manufacturing companies with fewer than 50 employees and nonmanufacturing companies with fewer than 15 employees were sampled separately without regard to industry classification to minimize year-to-year variation in survey estimates. Estimates for manufacturing companies in this group are combined with those for companies in "Other manufacturing industries." Estimates for nonmanufacturing companies in this group are combined with those for companies in "Other nonmanufacturing industries." As a result, statistics for "Other manufacturing industries" and for "Other nonmanufacturing industries" after 1995 are not comparable with statistics for prior years.

³ As a result of a new sample design, statistics for 1988–91 have been revised since originally published. These statistics now better reflect R&D performance among firms in the nonmanufacturing industries and small firms in all industries.

⁴ As a result of the new sample design, statistics for 1991 and later years are not directly comparable with statistics for 1990 and earlier years. See the technical notes for more information.

KEY: (D) = Data have been withheld to avoid disclosing operations of individual companies.

(S) = Indicates imputation of more than 50 percent. For years prior to 1993, data have been withheld.

NA = Not available.

SOURCE: National Science Foundation/Division of Science Resources Studies, Survey of Industrial Research and Development: 1998

**Table A-22. Company and other (except Federal) industrial R&D funds as a percent of net sales in R&D- performing companies,
by industry and by size of company: 1988-98**

Page 1 of 3

Industry and size of company	SIC code	1988 ³	1989 ³	1990 ³	1991 ^{3,4}	1992 ⁴	1993 ⁴	1994 ⁴	1995 ⁴	1996 ⁴	1997 ⁴	1998 ⁴
[Percent]												
Distribution by industry:												
All industries ¹		NA	NA	NA	NA	NA	NA	NA	2.8	3.0	2.9	3.1
Manufacturing.....		3.1	3.1	3.1	3.2	3.3	3.1	2.9	2.9	3.3	3.3	3.2
Food, kindred, and tobacco products.....	20,21	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.4	0.5	0.4
Textiles and apparel.....	22,23	0.4	0.5	0.6	0.6	0.6	0.6	0.6	0.9	0.8	0.9	1.1
Lumber, wood products, and furniture.....	24,25	0.6	0.6	0.6	0.9	0.9	0.7	0.6	0.7	1.4	0.9	0.8
Paper and allied products.....	26	0.8	0.8	1.0	1.1	1.0	1.1	1.0	1.0	1.2	1.1	1.0
Chemicals and allied products.....	28	5.2	5.4	5.3	5.3	5.4	6.0	5.1	4.7	5.3	5.3	6.4
Industrial chemicals.....	281-82,286	4.2	4.1	4.4	4.4	4.4	4.4	3.3	3.9	3.7	3.5	5.1
Drugs and medicines.....	283	8.8	8.9	8.8	8.9	9.6	12.5	10.2	10.4	10.1	10.5	10.6
Other chemicals.....	284-85,287-89	3.4	3.9	3.4	3.0	2.7	2.7	2.5	1.4	2.7	2.1	2.5
Petroleum refining and extraction.....	13,29	1.0	0.9	0.9	1.0	0.9	0.9	0.8	0.7	0.7	0.6	0.8
Rubber products.....	30	1.7	1.9	2.1	2.3	2.3	2.1	2.3	1.6	1.8	1.4	2.1
Stone, clay, and glass products.....	32	2.0	1.8	1.7	1.6	1.6	1.5	1.5	1.5	1.2	1.8	1.4
Primary metals.....	33	0.7	0.7	0.8	0.8	0.6	0.7	0.6	0.5	0.6	0.6	0.6
Ferrous metals and products.....	331-32,3398-99	0.5	0.5	0.5	0.5	0.4	0.4	0.3	0.3	0.4	0.6	0.5
Nonferrous metals and products.....	333-36	1.0	1.0	1.2	1.2	0.7	1.2	0.9	0.7	1.0	0.6	0.8
Fabricated metal products.....	34	1.1	1.2	1.1	1.2	1.1	1.1	1.0	1.1	1.4	1.5	1.4
Machinery.....	35	6.8	7.3	7.2	7.5	7.3	4.5	3.8	3.6	5.1	5.6	5.1
Office, computing, and accounting machines.....	357	11.2	13.1	14.4	14.9	13.7	9.8	7.9	8.1	9.9	9.2	9.2
Other machinery, except electrical.....	351-56,358-59	2.8	2.6	2.3	2.9	2.9	2.5	2.5	2.4	2.9	3.0	3.1
Electrical equipment.....	36	5.3	5.2	4.5	4.3	4.0	5.4	5.2	5.4	6.1	5.7	6.6
Radio and TV receiving equipment.....	365	2.4	1.8	1.6	1.0	0.6	4.0	1.0	1.6	2.0	2.6	2.9
Communication equipment.....	366	6.1	6.8	6.1	(S)	7.0	10.1	10.3	8.0	8.5	8.0	11.2
Electronic components.....	367	8.0	7.7	7.4	7.2	7.0	7.8	7.3	8.0	8.5	8.1	8.4
Other electrical equipment.....	361-64,369	2.3	2.3	2.2	2.2	2.1	2.3	2.1	2.5	2.6	2.7	2.8
Transportation equipment.....	37	3.5	3.5	3.4	4.0	4.2	3.9	3.7	3.6	4.1	3.8	2.5
Motor vehicles and motor vehicles equipment.....	371	3.4	3.7	3.7	4.1	4.0	3.7	3.4	3.6	4.2	3.8	2.2
Other transportation equipment.....	373-75,379	2.6	2.5	2.1	2.1	2.1	1.9	1.2	0.9	1.2	2.2	2.3
Aircraft and missiles.....	372,376	3.9	3.3	3.1	4.0	4.7	4.7	5.3	4.2	4.5	3.9	3.3

See explanatory information and SOURCE at end of table.

**Table A-22. Company and other (except Federal) industrial R&D funds as a percent of net sales in R&D- performing companies,
by industry and by size of company: 1988-98**

Page 2 of 3

Industry and size of company	SIC code	1988 ³	1989 ³	1990 ³	1991 ^{3,4}	1992 ⁴	1993 ⁴	1994 ⁴	1995 ⁴	1996 ⁴	1997 ⁴	1998 ⁴
[Percent]												
Distribution by industry:												
Professional and scientific instruments.....	38	7.1	6.8	7.1	7.1	7.2	7.2	6.5	7.3	7.7	7.7	8.0
Scientific and mechanical measuring instruments.....	381-82	7.6	6.9	6.9	6.3	6.2	6.4	5.8	6.6	6.7	6.5	6.5
Optical, surgical, photographic, and other instruments.....	384-87	7.1	7.1	7.5	8.0	8.2	7.9	7.2	8.0	8.6	8.9	9.2
Other manufacturing industries ²	27,31,39	1.0	0.9	0.9	0.8	1.3	1.3	1.1	1.2	2.5	2.0	2.0
Nonmanufacturing ¹		NA	NA	NA	NA	NA	NA	NA	2.4	2.2	2.2	2.9
Transportation and Utilities.....	40-42,44-49	NA	NA	NA	NA	NA	NA	NA	1.1	1.0	0.4	0.5
Communications.....	48	NA	NA	NA	NA	NA	NA	NA	2.2	1.9	0.7	0.9
Telephone communications.....	481	NA	NA	NA	NA	NA	NA	NA	2.1	1.9	0.7	0.9
Other communications.....	482-484,489	NA	NA	NA	NA	NA	NA	NA	3.0	1.3	0.7	1.0
Electric, gas, and sanitary services.....	49	NA	NA	NA	NA	NA	NA	NA	0.2	0.2	0.1	0.1
Other transportation and utilities.....	40-42,44-47	NA	NA	NA	NA	NA	NA	NA	0.1	0.3	0.3	0.4
Trade.....	50-59	NA	NA	NA	NA	NA	NA	NA	2.4	2.3	2.4	3.6
Finance, insurance, and real estate.....	60-65,67	NA	NA	NA	NA	NA	NA	NA	0.7	0.4	0.7	0.4
Services.....	701,72,73,75-81, 83,84,87,89	NA	NA	NA	NA	NA	NA	NA	5.9	6.8	8.6	9.2
Business services.....	73	NA	NA	NA	NA	NA	NA	NA	9.5	9.9	10.8	10.3
Computer and data processing services.....	737	NA	NA	NA	NA	NA	NA	NA	11.1	12.4	13.3	12.4
Other business services.....	731-736,738	NA	NA	NA	NA	NA	NA	NA	0.9	1.1	1.1	1.4
Health services.....	80	NA	NA	NA	NA	NA	NA	NA	5.2	(S) 5.9	5.2	8.4
Offices and clinics of medical doctors, hospitals, medical and dental labs.....	801,806,807	NA	NA	NA	NA	NA	NA	NA	5.3	(S) 6.1	(D)	8.7
Other health services.....	802-805,808-809	NA	NA	NA	NA	NA	NA	NA	(S) 2.4	3.4	(D)	5.9
Engineering and management services.....	87	NA	NA	NA	NA	NA	NA	NA	4.1	6.1	10.8	13.4
Engineering, architectural, and surveying.....	871	NA	NA	NA	NA	NA	NA	NA	2.0	2.5	2.6	2.7

See explanatory information and SOURCE at end of table.

**Table A-22. Company and other (except Federal) industrial R&D funds as a percent of net sales in R&D- performing companies,
by industry and by size of company: 1988-98**

Page 3 of 3

Industry and size of company	SIC code	1988 ³	1989 ³	1990 ³	1991 ^{3,4}	1992 ⁴	1993 ⁴	1994 ⁴	1995 ⁴	1996 ⁴	1997 ⁴	1998 ⁴
[Percent]												
Distribution by industry:												
Research, development, and testing.....	873	NA	NA	NA	NA	NA	NA	NA	NA	7.2	9.7	38.5
Other engineering and management services.....	872,874	NA	NA	NA	NA	NA	NA	NA	NA	1.7	1.3	2.8
Other services.....	701,72,75-79,81, 83,84,89	NA	NA	NA	NA	NA	NA	NA	NA	0.6	0.7	1.0
Other nonmanufacturing industries ²	07-12,14,15, 161-162,17	NA	NA	NA	NA	NA	NA	NA	NA	0.8	2.5	2.9
Distribution by size of company: [Number of employees]												
Total ¹		NA	NA	NA	NA	NA	NA	NA	NA	2.8	3.0	2.9
Fewer than 500.....		NA	NA	NA	NA	NA	NA	NA	NA	3.9	5.3	5.7
500 to 999.....		NA	NA	NA	NA	NA	NA	NA	NA	3.0	3.0	2.8
1,000 to 4,999.....		NA	NA	NA	NA	NA	NA	NA	NA	2.6	2.9	2.6
5,000 to 9,999.....		NA	NA	NA	NA	NA	NA	NA	NA	2.0	2.6	2.4
10,000 to 24,999.....		NA	NA	NA	NA	NA	NA	NA	NA	2.0	2.4	2.5
25,000 or more.....		NA	NA	NA	NA	NA	NA	NA	NA	3.1	2.9	3.0

¹ Beginning in 1995 this table included both manufacturing and nonmanufacturing companies. Only manufacturing companies were included in prior years.

² Beginning in 1996 manufacturing companies with fewer than 50 employees and nonmanufacturing companies with fewer than 15 employees were sampled separately without regard to industry classification to minimize year-to-year variation in survey estimates. Estimates for manufacturing companies in this group are combined with those for companies in "Other manufacturing industries." Estimates for nonmanufacturing companies in this group are combined with those for companies in "Other nonmanufacturing industries." As a result, statistics for "Other manufacturing industries" and for "Other nonmanufacturing industries" after 1995 are not comparable with statistics for prior years.

³ As a result of a new sample design, statistics for 1988-91 have been revised since originally published. These statistics now better reflect R&D performance among firms in the in the nonmanufacturing industries and small firms in all industries.

⁴ As a result of the new sample design, statistics for 1991 and later years are not directly comparable with statistics for 1990 and earlier years. See the technical notes for more information.

KEY: (D) = Data have been withheld to avoid disclosing operations of individual companies.

(S) = Indicates imputation of more than 50 percent. For years prior to 1993, data have been withheld.

NA = Not available.

SOURCE: National Science Foundation/Division of Science Resources Studies, Survey of Industrial Research and Development: 1998

**Table A-22. Company and other (except Federal) industrial R&D funds as a percent of net sales in R&D- performing companies,
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Page 1 of 3

Industry and size of company	SIC code	1988 ³	1989 ³	1990 ³	1991 ^{3,4}	1992 ⁴	1993 ⁴	1994 ⁴	1995 ⁴	1996 ⁴	1997 ⁴	1998 ⁴
[Percent]												
Distribution by industry:												
All industries ¹		NA	NA	NA	NA	NA	NA	NA	2.8	3.0	2.9	3.1
Manufacturing.....		3.1	3.1	3.1	3.2	3.3	3.1	2.9	2.9	3.3	3.3	3.2
Food, kindred, and tobacco products.....	20,21	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.4	0.5	0.4
Textiles and apparel.....	22,23	0.4	0.5	0.6	0.6	0.6	0.6	0.6	0.9	0.8	0.9	1.1
Lumber, wood products, and furniture.....	24,25	0.6	0.6	0.6	0.9	0.9	0.7	0.6	0.7	1.4	0.9	0.8
Paper and allied products.....	26	0.8	0.8	1.0	1.1	1.0	1.1	1.0	1.0	1.2	1.1	1.0
Chemicals and allied products.....	28	5.2	5.4	5.3	5.3	5.4	6.0	5.1	4.7	5.3	5.3	6.4
Industrial chemicals.....	281-82,286	4.2	4.1	4.4	4.4	4.4	4.4	3.3	3.9	3.7	3.5	5.1
Drugs and medicines.....	283	8.8	8.9	8.8	8.9	9.6	12.5	10.2	10.4	10.1	10.5	10.6
Other chemicals.....	284-85,287-89	3.4	3.9	3.4	3.0	2.7	2.7	2.5	1.4	2.7	2.1	2.5
Petroleum refining and extraction.....	13,29	1.0	0.9	0.9	1.0	0.9	0.9	0.8	0.7	0.7	0.6	0.8
Rubber products.....	30	1.7	1.9	2.1	2.3	2.3	2.1	2.3	1.6	1.8	1.4	2.1
Stone, clay, and glass products.....	32	2.0	1.8	1.7	1.6	1.6	1.5	1.5	1.5	1.2	1.8	1.4
Primary metals.....	33	0.7	0.7	0.8	0.8	0.6	0.7	0.6	0.5	0.6	0.6	0.6
Ferrous metals and products.....	331-32,3398-99	0.5	0.5	0.5	0.5	0.4	0.4	0.3	0.3	0.4	0.6	0.5
Nonferrous metals and products.....	333-36	1.0	1.0	1.2	1.2	0.7	1.2	0.9	0.7	1.0	0.6	0.8
Fabricated metal products.....	34	1.1	1.2	1.1	1.2	1.1	1.1	1.0	1.1	1.4	1.5	1.4
Machinery.....	35	6.8	7.3	7.2	7.5	7.3	4.5	3.8	3.6	5.1	5.6	5.1
Office, computing, and accounting machines.....	357	11.2	13.1	14.4	14.9	13.7	9.8	7.9	8.1	9.9	9.2	9.2
Other machinery, except electrical.....	351-56,358-59	2.8	2.6	2.3	2.9	2.9	2.5	2.5	2.4	2.9	3.0	3.1
Electrical equipment.....	36	5.3	5.2	4.5	4.3	4.0	5.4	5.2	5.4	6.1	5.7	6.6
Radio and TV receiving equipment.....	365	2.4	1.8	1.6	1.0	0.6	4.0	1.0	1.6	2.0	2.6	2.9
Communication equipment.....	366	6.1	6.8	6.1	(S)	7.0	10.1	10.3	8.0	8.5	8.0	11.2
Electronic components.....	367	8.0	7.7	7.4	7.2	7.0	7.8	7.3	8.0	8.5	8.1	8.4
Other electrical equipment.....	361-64,369	2.3	2.3	2.2	2.2	2.1	2.3	2.1	2.5	2.6	2.7	2.8
Transportation equipment.....	37	3.5	3.5	3.4	4.0	4.2	3.9	3.7	3.6	4.1	3.8	2.5
Motor vehicles and motor vehicles equipment.....	371	3.4	3.7	3.7	4.1	4.0	3.7	3.4	3.6	4.2	3.8	2.2
Other transportation equipment.....	373-75,379	2.6	2.5	2.1	2.1	2.1	1.9	1.2	0.9	1.2	2.2	2.3
Aircraft and missiles.....	372,376	3.9	3.3	3.1	4.0	4.7	4.7	5.3	4.2	4.5	3.9	3.3

See explanatory information and SOURCE at end of table.

**Table A-22. Company and other (except Federal) industrial R&D funds as a percent of net sales in R&D- performing companies,
by industry and by size of company: 1988-98**

Page 2 of 3

Industry and size of company	SIC code	1988 ³	1989 ³	1990 ³	1991 ^{3,4}	1992 ⁴	1993 ⁴	1994 ⁴	1995 ⁴	1996 ⁴	1997 ⁴	1998 ⁴
[Percent]												
Distribution by industry:												
Professional and scientific instruments.....	38	7.1	6.8	7.1	7.1	7.2	7.2	6.5	7.3	7.7	7.7	8.0
Scientific and mechanical measuring instruments.....	381-82	7.6	6.9	6.9	6.3	6.2	6.4	5.8	6.6	6.7	6.5	6.5
Optical, surgical, photographic, and other instruments.....	384-87	7.1	7.1	7.5	8.0	8.2	7.9	7.2	8.0	8.6	8.9	9.2
Other manufacturing industries ²	27,31,39	1.0	0.9	0.9	0.8	1.3	1.3	1.1	1.2	2.5	2.0	2.0
Nonmanufacturing ¹		NA	NA	NA	NA	NA	NA	NA	2.4	2.2	2.2	2.9
Transportation and Utilities.....	40-42,44-49	NA	NA	NA	NA	NA	NA	NA	1.1	1.0	0.4	0.5
Communications.....	48	NA	NA	NA	NA	NA	NA	NA	2.2	1.9	0.7	0.9
Telephone communications.....	481	NA	NA	NA	NA	NA	NA	NA	2.1	1.9	0.7	0.9
Other communications.....	482-484,489	NA	NA	NA	NA	NA	NA	NA	3.0	1.3	0.7	1.0
Electric, gas, and sanitary services.....	49	NA	NA	NA	NA	NA	NA	NA	0.2	0.2	0.1	0.1
Other transportation and utilities.....	40-42,44-47	NA	NA	NA	NA	NA	NA	NA	0.1	0.3	0.3	0.4
Trade.....	50-59	NA	NA	NA	NA	NA	NA	NA	2.4	2.3	2.4	3.6
Finance, insurance, and real estate.....	60-65,67	NA	NA	NA	NA	NA	NA	NA	0.7	0.4	0.7	0.4
Services.....	701,72,73,75-81, 83,84,87,89	NA	NA	NA	NA	NA	NA	NA	5.9	6.8	8.6	9.2
Business services.....	73	NA	NA	NA	NA	NA	NA	NA	9.5	9.9	10.8	10.3
Computer and data processing services.....	737	NA	NA	NA	NA	NA	NA	NA	11.1	12.4	13.3	12.4
Other business services.....	731-736,738	NA	NA	NA	NA	NA	NA	NA	0.9	1.1	1.1	1.4
Health services.....	80	NA	NA	NA	NA	NA	NA	NA	5.2	(S) 5.9	5.2	8.4
Offices and clinics of medical doctors, hospitals, medical and dental labs.....	801,806,807	NA	NA	NA	NA	NA	NA	NA	5.3	(S) 6.1	(D)	8.7
Other health services.....	802-805,808-809	NA	NA	NA	NA	NA	NA	NA	(S) 2.4	3.4	(D)	5.9
Engineering and management services.....	87	NA	NA	NA	NA	NA	NA	NA	4.1	6.1	10.8	13.4
Engineering, architectural, and surveying.....	871	NA	NA	NA	NA	NA	NA	NA	2.0	2.5	2.6	2.7

See explanatory information and SOURCE at end of table.

**Table A-22. Company and other (except Federal) industrial R&D funds as a percent of net sales in R&D- performing companies,
by industry and by size of company: 1988–98**

Page 3 of 3

Industry and size of company	SIC code	1988 ³	1989 ³	1990 ³	1991 ^{3,4}	1992 ⁴	1993 ⁴	1994 ⁴	1995 ⁴	1996 ⁴	1997 ⁴	1998 ⁴
[Percent]												
Distribution by industry:												
Research, development, and testing.....	873	NA	NA	NA	NA	NA	NA	NA	NA	7.2	9.7	38.5
Other engineering and management services.....	872,874	NA	NA	NA	NA	NA	NA	NA	NA	1.7	1.3	2.8
Other services.....	701,72,75–79,81, 83,84,89	NA	NA	NA	NA	NA	NA	NA	NA	0.6	0.7	1.0
Other nonmanufacturing industries ²	07–12,14,15, 161–162,17	NA	NA	NA	NA	NA	NA	NA	NA	0.8	2.5	2.9
Distribution by size of company: [Number of employees]												
Total ¹		NA	NA	NA	NA	NA	NA	NA	NA	2.8	3.0	2.9
Fewer than 500.....		NA	NA	NA	NA	NA	NA	NA	NA	3.9	5.3	5.7
500 to 999.....		NA	NA	NA	NA	NA	NA	NA	NA	3.0	3.0	2.8
1,000 to 4,999.....		NA	NA	NA	NA	NA	NA	NA	NA	2.6	2.9	2.6
5,000 to 9,999.....		NA	NA	NA	NA	NA	NA	NA	NA	2.0	2.6	2.4
10,000 to 24,999.....		NA	NA	NA	NA	NA	NA	NA	NA	2.0	2.4	2.5
25,000 or more.....		NA	NA	NA	NA	NA	NA	NA	NA	3.1	2.9	3.0

¹ Beginning in 1995 this table included both manufacturing and nonmanufacturing companies. Only manufacturing companies were included in prior years.

² Beginning in 1996 manufacturing companies with fewer than 50 employees and nonmanufacturing companies with fewer than 15 employees were sampled separately without regard to industry classification to minimize year-to-year variation in survey estimates. Estimates for manufacturing companies in this group are combined with those for companies in "Other manufacturing industries." Estimates for nonmanufacturing companies in this group are combined with those for companies in "Other nonmanufacturing industries." As a result, statistics for "Other manufacturing industries" and for "Other nonmanufacturing industries" after 1995 are not comparable with statistics for prior years.

³ As a result of a new sample design, statistics for 1988–91 have been revised since originally published. These statistics now better reflect R&D performance among firms in the in the nonmanufacturing industries and small firms in all industries.

⁴ As a result of the new sample design, statistics for 1991 and later years are not directly comparable with statistics for 1990 and earlier years. See the technical notes for more information.

KEY: (D) = Data have been withheld to avoid disclosing operations of individual companies.

(S) = Indicates imputation of more than 50 percent. For years prior to 1993, data have been withheld.

NA = Not available.

SOURCE: National Science Foundation/Division of Science Resources Studies, Survey of Industrial Research and Development: 1998

**Table A-23. Total (company, Federal, and other) industrial R&D funds as a percent of net sales in R&D-performing companies,
by industry and ranked by size of total R&D program: 1998**

Page 1 of 3

Industry	SIC code	Total R&D funds as a percent of net sales			Total R&D funds		
		First 4 companies	Next 4 companies	Next 12 companies	First 4 companies	Next 4 companies	Next 12 companies
		[Percent]			[In millions of dollars]		
All industries.....		8.2	9.4	9.0	19,688	13,700	22,268
Manufacturing.....		8.2	10.0	7.0	19,688	12,878	18,908
Food, kindred, and tobacco products.....	20,21	1.0	1.3	0.3	658	261	345
Textiles and apparel.....	22,23	2.4	1.3	0.6	292	68	76
Lumber, wood products, and furniture.....	24,25	1.9	0.9	0.7	119	67	105
Paper and allied products.....	26	2.4	1.2	0.5	(S) 966	177	197
Chemicals and allied products.....	28	9.5	6.8	11.3	4,688	4,043	5,499
Industrial chemicals.....	281-82,286	6.3	6.2	3.8	2,669	879	930
Drugs and medicines.....	283	14.0	8.3	12.7	4,637	3,336	3,531
Other chemicals.....	284-85,287-89	3.8	2.7	2.1	1,217	279	378
Petroleum refining and extraction.....	13,29	1.8	1.0	0.2	1,097	469	186
Rubber products.....	30	5.2	2.9	2.7	751	194	277
Stone, clay, and glass products.....	32	2.9	1.4	1.1	384	113	74
Primary metals.....	33	1.2	0.7	0.6	(S) 484	100	154
Ferrous metals and products.....	331-32,3398-99	1.1	0.5	0.6	(S) 395	61	81
Nonferrous metals and products.....	333-36	1.0	1.5	0.6	188	53	56
Fabricated metal products.....	34	2.7	2.2	0.8	690	208	188
Machinery.....	35	10.2	7.5	6.8	5,547	1,817	2,544
Office, computing, and accounting machines.....	357	10.9	10.7	9.0	5,399	1,275	1,412
Other machinery, except electrical.....	351-56,358-59	5.4	5.2	3.5	1,758	725	956
Electrical equipment.....	36	13.3	4.5	11.1	10,707	4,061	3,956
Radio and TV receiving equipment.....	365	2.9	4.7	1.7	131	15	9
Communication equipment.....	366	15.0	13.1	12.5	8,652	888	863
Electronic components.....	367	13.3	6.9	11.0	4,933	1,214	1,514
Other electrical equipment.....	361-64,369	3.4	4.1	2.0	3,031	453	439

See explanatory information and SOURCE at end of table.

**Table A-23. Total (company, Federal, and other) industrial R&D funds as a percent of net sales in R&D-performing companies,
by industry and ranked by size of total R&D program: 1998**

Page 2 of 3

Industry	SIC code	Total R&D funds as a percent of net sales			Total R&D funds		
		First 4 companies	Next 4 companies	Next 12 companies	First 4 companies	Next 4 companies	Next 12 companies
		[Percent]			[In millions of dollars]		
Transportation equipment.....	37	6.6	6.4	3.8	18,298	6,419	3,055
Motor vehicles and motor vehicles equipment.....	371	4.8	1.4	0.8	12,663	539	461
Other transportation equipment.....	373-75,379	4.1	2.3	4.7	455	39	2
Aircraft and missiles.....	372,376	11.2	6.8	3.5	11,206	2,713	505
Professional and scientific instruments.....	38	16.9	15.0	11.0	8,181	1,228	1,692
Scientific and mechanical measuring instruments.....	381-82	21.5	13.4	8.1	6,195	541	522
Optical, surgical, photographic, and other instruments.....	384-87	11.7	11.0	9.4	3,162	777	920
Other manufacturing industries ¹	27,31,39	3.0	3.1	0.8	325	141	172
Nonmanufacturing.....		14.8	4.4	5.6	8,625	3,236	4,096
Transportation and utilities.....	40-42,44-49	1.9	0.5	0.4	1,619	490	356
Communications.....	48	1.9	0.4	0.9	1,619	406	165
Telephone communications.....	481	1.5	0.3	0.5	1,587	235	57
Other communications.....	482-484,489	3.1	2.5	0.0	311	0	0
Electric, gas, and sanitary services.....	49	0.2	0.3	0.2	70	34	65
Other transportation and utilities.....	40-42,44-47	0.7	0.1	0.1	221	18	14
Trade.....	50-59	11.1	4.5	5.6	6,011	806	1,233
Finance, insurance, and real estate.....	60-65,67	2.4	0.5	0.2	882	266	171
Services.....	701,72,73,75-81, 83,84,87,89	20.3	11.1	23.6	5,580	1,524	2,266
Business services.....	73	16.5	14.3	17.9	4,261	1,021	1,664
Computer and data processing services.....	737	16.5	14.3	17.9	4,261	1,021	1,664
Other business services.....	731-736,738	4.1	1.5	0.5	(S) 154	39	55

See explanatory information and SOURCE at end of table.

**Table A-23. Total (company, Federal, and other) industrial R&D funds as a percent of net sales in R&D-performing companies,
by industry and ranked by size of total R&D program: 1998**

Page 3 of 3

Industry	SIC code	Total R&D funds as a percent of net sales			Total R&D funds		
		First 4 companies	Next 4 companies	Next 12 companies	First 4 companies	Next 4 companies	Next 12 companies
		[Percent]			[In millions of dollars]		
Health services.....	80	7.9	1.5	0.5	577	24	13
Offices and clinics of medical doctors, hospitals, medical and dental labs.....	801,806,807	6.5	0.2	2.1	537	4	1
Other health services.....	802-805,808-809	9.8	3.7	0.3	63	7	1
Engineering and management services.....	87	44.4	36.0	72.9	(S) 2,474	511	829
Engineering, architectural, and surveying.....	871	38.1	37.8	5.2	752	194	326
Research, development, and testing.....	873	48.2	38.0	78.0	(S) 2,180	350	628
Other engineering and management services.....	872,874	12.5	3.5	1.2	219	72	62
Other services.....	701,72,75-79,81, 83,84,89	0.9	1.5	0.5	193	38	38
Other nonmanufacturing industries ¹	07-12,14,15, 161-162,17	5.3	0.9	0.6	426	52	60

¹ Manufacturing companies with fewer than 50 employees and nonmanufacturing companies with fewer than 15 employees were sampled separately without regard to industry classification to minimize year-to-year variation in survey estimates. Estimates for manufacturing companies in this group are combined with those for companies in "Other manufacturing industries." Estimates for nonmanufacturing companies in this group are combined with those for companies in "Other nonmanufacturing industries."

KEY: (S) = Indicates imputation of more than 50 percent.

NOTE: Rankings were based on total (company, Federal, and other) R&D funds.

SOURCE: National Science Foundation/Division of Science Resources Studies, Survey of Industrial Research and Development: 1998

**Table A-24. Company and other (except Federal) industrial R&D funds as a percent of net sales in R&D-performing companies,
by industry and ranked by size of company-financed R&D program: 1998**

Page 1 of 3

Industry	SIC code	Company and other R&D funds as a percent of net sales			Company and other R&D funds		
		First 4 companies	Next 4 companies	Next 12 companies	First 4 companies	Next 4 companies	Next 12 companies
		[Percent]			[In millions of dollars]		
All industries.....		6.6	12.8	5.8	16,805	10,563	16,767
Manufacturing.....		6.6	5.4	7.5	16,238	9,104	14,978
Food, kindred, and tobacco products.....	20,21	1.0	1.3	0.3	658	261	345
Textiles and apparel.....	22,23	2.4	1.3	0.6	292	68	76
Lumber, wood products, and furniture.....	24,25	1.9	0.8	0.7	119	66	96
Paper and allied products.....	26	2.2	1.2	0.5	(S) 923	177	197
Chemicals and allied products.....	28	9.5	6.8	11.5	4,686	4,043	5,357
Industrial chemicals.....	281-82,286	6.2	4.6	3.8	2,530	706	921
Drugs and medicines.....	283	14.0	8.3	12.7	4,637	3,336	3,531
Other chemicals.....	284-85,287-89	3.8	2.7	2.1	1,217	279	368
Petroleum refining and extraction.....	13,29	1.8	1.0	0.2	1,097	467	184
Rubber products.....	30	4.2	2.1	2.7	581	158	277
Stone, clay, and glass products.....	32	2.9	1.4	1.1	384	113	74
Primary metals.....	33	0.6	1.0	0.6	270	99	154
Ferrous metals and products.....	331-32,3398-99	0.5	0.5	0.5	(S) 187	61	75
Nonferrous metals and products.....	333-36	1.0	1.5	0.6	182	53	54
Fabricated metal products.....	34	2.7	2.2	0.7	682	208	164
Machinery.....	35	10.2	7.5	6.8	5,520	1,816	2,535
Office, computing, and accounting machines.....	357	10.9	10.7	8.9	5,399	1,274	1,400
Other machinery, except electrical.....	351-56,358-59	5.0	5.7	3.5	1,729	718	942
Electrical equipment.....	36	12.8	4.1	9.9	10,274	3,671	3,445
Radio and TV receiving equipment.....	365	2.9	4.7	1.7	131	15	9
Communication equipment.....	366	13.9	12.2	9.3	7,798	804	837
Electronic components.....	367	13.3	6.8	11.0	4,930	1,202	1,514
Other electrical equipment.....	361-64,369	3.0	4.1	2.0	2,634	452	439

See explanatory information and SOURCE at end of table.

**Table A-24. Company and other (except Federal) industrial R&D funds as a percent of net sales in R&D-performing companies,
by industry and ranked by size of company-financed R&D program: 1998**

Page 2 of 3

Industry	SIC code	Company and other R&D funds as a percent of net sales			Company and other R&D funds		
		First 4 companies	Next 4 companies	Next 12 companies	First 4 companies	Next 4 companies	Next 12 companies
		[Percent]			[In millions of dollars]		
Transportation equipment.....	37	4.4	3.4	2.0	13,738	2,246	1,612
Motor vehicles and motor vehicles equipment.....	371	4.5	1.4	0.8	11,934	539	457
Other transportation equipment.....	373-75,379	1.9	2.3	4.7	211	39	2
Aircraft and missiles.....	372,376	3.5	2.9	2.2	4,050	754	296
Professional and scientific instruments.....	38	7.1	15.8	10.0	3,458	1,150	1,634
Scientific and mechanical measuring instruments.....	381-82	4.9	13.3	7.3	1,402	537	474
Optical, surgical, photographic, and other instruments.....	384-87	11.5	10.9	9.3	3,111	773	908
Other manufacturing industries ¹	27,31,39	3.0	3.1	0.8	325	141	171
Nonmanufacturing.....		13.0	3.8	5.0	7,868	2,777	3,484
Transportation and utilities.....	40-42,44-49	1.3	0.4	0.4	1,355	328	309
Communications.....	48	1.3	0.3	0.6	1,355	235	143
Telephone communications.....	481	1.3	0.3	0.5	1,355	235	57
Other communications.....	482-484,489	0.9	2.5	0.0	86	0	0
Electric, gas, and sanitary services.....	49	0.2	0.3	0.1	56	33	59
Other transportation and utilities.....	40-42,44-47	0.7	0.1	0.1	221	18	14
Trade.....	50-59	11.0	4.5	5.6	5,986	806	1,233
Finance, insurance, and real estate.....	60-65,67	2.4	0.5	0.2	882	266	170
Services.....	701,72,73,75-81, 83,84,87,89	14.4	14.1	22.9	4,407	1,139	1,933
Business services.....	73	16.4	14.3	17.9	4,233	1,021	1,664
Computer and data processing services.....	737	16.4	14.3	17.9	4,233	1,021	1,664
Other business services.....	731-736,738	4.0	1.5	0.4	(S) 148	39	50

See explanatory information and SOURCE at end of table.

**Table A-24. Company and other (except Federal) industrial R&D funds as a percent of net sales in R&D-performing companies,
by industry and ranked by size of company-financed R&D program: 1998**

Page 3 of 3

Industry	SIC code	Company and other R&D funds as a percent of net sales			Company and other R&D funds		
		First 4 companies	Next 4 companies	Next 12 companies	First 4 companies	Next 4 companies	Next 12 companies
		[Percent]			[In millions of dollars]		
Health services.....	80	7.9	1.5	0.5	574	24	11
Offices and clinics of medical doctors, hospitals, medical and dental labs.....	801,806,807	6.5	0.2	1.3	536	4	0
Other health services.....	802-805,808-809	9.7	2.7	0.3	62	6	1
Engineering and management services.....	87	48.8	41.0	15.4	641	387	680
Engineering, architectural, and surveying.....	871	21.5	3.9	2.1	230	78	120
Research, development, and testing.....	873	40.4	90.8	14.1	616	327	616
Other engineering and management services.....	872,874	12.3	3.5	1.2	217	72	58
Other services.....	701,72,75-79,81, 83,84,89	0.7	0.7	0.3	185	25	26
Other nonmanufacturing industries ¹	07-12,14,15, 161-162,17	5.2	0.9	0.6	418	50	59

¹ Manufacturing companies with fewer than 50 employees and nonmanufacturing companies with fewer than 15 employees were sampled separately without regard to industry classification to minimize year-to-year variation in survey estimates. Estimates for manufacturing companies in this group are combined with those for companies in "Other manufacturing industries." Estimates for nonmanufacturing companies in this group are combined with those for companies in "Other nonmanufacturing industries."

KEY: (S) = Indicates imputation of more than 50 percent.

NOTE: Rankings were based on company and other R&D funds.

SOURCE: National Science Foundation/Division of Science Resources Studies, Survey of Industrial Research and Development: 1998

**Table A-25. Federal industrial R&D funds as a percent of net sales in R&D-performing companies,
by industry and ranked by size of federally financed R&D program: 1998**

Page 1 of 3

Industry	SIC code	Federal R&D funds as a percent of net sales			Federal R&D funds		
		First 4 companies	Next 4 companies	Next 12 companies	First 4 companies	Next 4 companies	Next 12 companies
		[Percent]			[In millions of dollars]		
All industries.....		19.0	2.3	2.0	11,057	4,168	3,388
Manufacturing.....		17.3	1.7	2.1	10,959	(D)	(D)
Food, kindred, and tobacco products.....	20,21	0.0	0.0	0.0	0	0	0
Textiles and apparel.....	22,23	0.0	0.0	0.0	(D)	0	0
Lumber, wood products, and furniture.....	24,25	2.1	0.0	0.0	10	0	0
Paper and allied products.....	26	0.2	0.0	0.0	(D)	0	0
Chemicals and allied products.....	28	2.9	0.2	0.0	(D)	11	7
Industrial chemicals.....	281-82,286	2.5	0.0	0.0	(D)	10	(D)
Drugs and medicines.....	283	0.5	0.0	0.0	5	0	0
Other chemicals.....	284-85,287-89	4.3	0.0	0.0	(D)	0	0
Petroleum refining and extraction.....	13,29	0.0	0.0	0.0	5	0	0
Rubber products.....	30	2.6	0.0	0.0	(D)	0	0
Stone, clay, and glass products.....	32	0.0	0.0	0.0	(D)	0	0
Primary metals.....	33	1.6	0.0	0.0	219	6	0
Ferrous metals and products.....	331-32,3398-99	2.8	0.0	0.0	(D)	(D)	0
Nonferrous metals and products.....	333-36	0.1	0.0	0.0	10	0	0
Fabricated metal products.....	34	0.7	0.1	0.0	41	0	0
Machinery.....	35	0.2	0.1	0.0	55	(S) 7	3
Office, computing, and accounting machines.....	357	0.6	0.0	0.0	13	0	0
Other machinery, except electrical.....	351-56,358-59	0.2	0.1	0.0	46	5	1
Electrical equipment.....	36	1.4	11.8	0.3	1,332	82	51
Radio and TV receiving equipment.....	365	0.0	0.0	0.0	0	0	0
Communication equipment.....	366	4.6	0.3	0.0	988	10	0
Electronic components.....	367	1.0	0.2	0.0	49	15	5
Other electrical equipment.....	361-64,369	0.5	0.0	0.0	401	5	(D)

See explanatory information and SOURCE at end of table.

**Table A-25. Federal industrial R&D funds as a percent of net sales in R&D-performing companies,
by industry and ranked by size of federally financed R&D program: 1998**

Page 2 of 3

Industry	SIC code	Federal R&D funds as a percent of net sales			Federal R&D funds		
		First 4 companies	Next 4 companies	Next 12 companies	First 4 companies	Next 4 companies	Next 12 companies
		[Percent]			[In millions of dollars]		
Transportation equipment.....	37	8.1	1.1	0.6	8,043	1,689	594
Motor vehicles and motor vehicles equipment.....	371	0.4	0.0	0.0	(D)	(D)	0
Other transportation equipment.....	373-75,379	2.7	0.0	0.0	(D)	0	0
Aircraft and missiles.....	372,376	8.1	3.0	0.9	8,043	1,179	120
Professional and scientific instruments.....	38	13.3	3.9	0.8	(D)	125	52
Scientific and mechanical measuring instruments.....	381-82	17.6	2.7	0.7	(D)	87	17
Optical, surgical, photographic, and other instruments.....	384-87	0.6	0.2	0.0	70	(S) 5	(D)
Other manufacturing industries ¹	27,31,39	0.2	0.0	0.0	2	0	0
Nonmanufacturing.....		6.8	25.3	3.5	(S) 2,280	(S) 418	386
Transportation and utilities.....	40-42,44-49	0.5	0.1	0.0	472	11	0
Communications.....	48	0.5	0.0	0.0	458	0	0
Telephone communications.....	481	0.2	0.0	0.0	(D)	0	0
Other communications.....	482-484,489	2.4	0.0	0.0	(D)	0	0
Electric, gas, and sanitary services.....	49	0.1	0.0	0.0	(D)	0	0
Other transportation and utilities.....	40-42,44-47	0.0	0.0	0.0	0	0	0
Trade.....	50-59	0.1	0.1	0.0	(S) 63	(S) 1	0
Finance, insurance, and real estate.....	60-65,67	0.1	0.0	0.0	(D)	0	0
Services.....	701,72,73,75-81, 83,84,87,89	38.8	87.8	2.9	(S) 2,125	232	319
Business services.....	73	1.2	50.4	5.2	123	67	70
Computer and data processing services.....	737	1.2	50.4	4.1	123	67	60
Other business services.....	731-736,738	0.4	0.0	0.0	(D)	0	0

See explanatory information and SOURCE at end of table.

**Table A-25. Federal industrial R&D funds as a percent of net sales in R&D-performing companies,
by industry and ranked by size of federally financed R&D program: 1998**

Page 3 of 3

Industry	SIC code	Federal R&D funds as a percent of net sales			Federal R&D funds		
		First 4 companies	Next 4 companies	Next 12 companies	First 4 companies	Next 4 companies	Next 12 companies
		[Percent]			[In millions of dollars]		
Health services.....	80	0.1	0.3	0.0	4	(D)	0
Offices and clinics of medical doctors, hospitals, medical and dental labs.....	801,806,807	0.0	0.0	0.0	2	0	0
Other health services.....	802-805,808-809	1.9	0.0	0.0	2	0	0
Engineering and management services.....	87	38.8	87.8	57.7	(S) 2,125	232	269
Engineering, architectural, and surveying.....	871	30.9	83.0	5.1	609	175	207
Research, development, and testing.....	873	45.5	53.2	26.8	(D)	69	93
Other engineering and management services.....	872,874	0.5	0.1	0.0	9	0	0
Other services.....	701,72,75-79,81, 83,84,89	0.8	0.0	0.0	34	0	0
Other nonmanufacturing industries ¹	07-12,14,15, 161-162,17	0.4	42.7	0.0	11	1	0

¹ Manufacturing companies with fewer than 50 employees and nonmanufacturing companies with fewer than 15 employees were sampled separately without regard to industry classification to minimize year-to-year variation in survey estimates. Estimates for manufacturing companies in this group are combined with those for companies in "Other manufacturing industries." Estimates for nonmanufacturing companies in this group are combined with those for companies in "Other nonmanufacturing industries."

KEY: (D) = Data have been withheld to avoid disclosing operations of individual companies.

(S) = Indicates imputation of more than 50 percent.

NOTE: Rankings were based on Federal R&D funds.

SOURCE: National Science Foundation/Division of Science Resources Studies, Survey of Industrial Research and Development: 1998

Table A-26. Total (company, Federal, and other) funds for performance of industrial basic research, applied research, and development, in current and in constant dollars: 1953-98

Page 1 of 2

Year	Total		Basic research		Applied research		Development	
	Current dollars	Constant 1992 dollars	Current dollars	Constant 1992 dollars	Current dollars	Constant 1992 dollars	Current dollars	Constant 1992 dollars
[In millions of dollars]								
1953 ¹	3,630	17,988	151	748	726	3,598	2,753	13,642
1954 ¹	4,070	19,941	166	813	814	3,988	3,090	15,140
1955 ¹	4,640	22,372	189	911	928	4,474	3,523	16,986
1956.....	6,605	30,764	253	1,178	1,268	5,906	5,084	23,680
1957.....	7,731	34,856	271	1,222	1,670	7,529	5,790	26,105
1958.....	8,389	36,940	295	1,299	1,911	8,415	6,183	27,226
1959.....	9,618	41,908	320	1,394	1,991	8,675	7,307	31,839
1960.....	10,509	45,161	376	1,616	2,029	8,719	8,104	34,826
1961.....	10,908	46,338	395	1,678	1,977	8,398	8,536	36,262
1962.....	11,464	48,087	488	2,047	2,449	10,273	8,527	35,768
1963.....	12,630	52,363	522	2,164	2,457	10,187	9,651	40,012
1964.....	13,512	55,196	549	2,243	2,600	10,621	10,363	42,333
1965.....	14,185	56,831	592	2,372	2,658	10,649	10,935	43,810
1966.....	15,548	60,569	624	2,431	2,843	11,075	12,081	47,063
1967.....	16,385	61,854	629	2,374	2,915	11,004	12,841	48,475
1968.....	17,429	63,057	642	2,323	3,124	11,302	13,663	49,432
1969.....	18,308	63,262	618	2,135	3,287	11,358	14,403	49,768
1970.....	18,067	59,275	602	1,975	3,427	11,243	14,038	46,056
1971.....	18,320	57,143	590	1,840	3,415	10,652	14,315	44,651
1972.....	19,552	58,504	593	1,774	3,514	10,515	15,445	46,215
1973.....	21,249	60,195	631	1,788	3,825	10,836	16,793	47,572
1974.....	22,887	59,493	699	1,817	4,288	11,146	17,900	46,530
1975.....	24,187	57,465	730	1,734	4,570	10,858	18,887	44,873
1976.....	26,997	60,599	819	1,838	5,112	11,475	21,066	47,286
1977.....	29,825	62,882	911	1,921	5,636	11,883	23,278	49,079
1978 ¹	33,304	65,443	1,035	2,034	6,300	12,380	25,969	51,030
1979.....	38,226	69,212	1,158	2,097	7,225	13,082	29,843	54,034
1980 ¹	44,505	73,769	1,325	2,196	8,450	14,006	34,730	57,567
1981.....	51,810	78,488	1,614	2,445	10,699	16,208	39,497	59,835
1982 ¹	58,650	83,583	1,904	2,713	12,323	17,562	44,423	63,308
1983.....	65,268	89,213	2,223	3,039	13,927	19,036	49,118	67,138
1984.....	74,800	98,525	2,608	3,435	15,765	20,765	56,427	74,324
1985.....	84,239	107,270	2,862	3,644	18,255	23,246	63,122	80,379
1986 ²	87,823	108,989	4,047	5,022	19,759	24,521	64,017	79,445
1987 ²	92,155	110,950	4,324	5,206	19,813	23,854	68,018	81,890
1988 ^{2,3}	97,015	112,690	4,500	5,227	20,748	24,100	71,767	83,363
1989 ^{2,3}	102,055	113,748	5,216	5,814	22,691	25,291	74,148	82,644

See explanatory information and SOURCE at end of table

Table A-26. Total (company, Federal, and other) funds for performance of industrial basic research, applied research, and development, in current and in constant dollars: 1953-98

Page 2 of 2

Year	Total		Basic research		Applied research		Development	
	Current dollars	Constant 1992 dollars	Current dollars	Constant 1992 dollars	Current dollars	Constant 1992 dollars	Current dollars	Constant 1992 dollars
[In millions of dollars]								
1990 ^{2, 3}	109,727	117,230	5,128	5,479	24,785	26,480	79,814	85,271
1991 ^{2, 3, 4}	116,952	120,173	7,837	8,053	27,446	28,202	81,669	83,918
1992 ^{2, 4}	119,110	119,110	7,002	7,002	26,168	26,168	85,940	85,940
1993 ^{2, 4}	117,400	114,380	6,919	6,741	24,686	24,051	85,796	83,589
1994 ^{2, 4}	119,595	113,802	7,017	6,677	23,490	22,352	89,088	84,773
1995 ^{2, 4}	132,103	122,875	6,099	5,673	27,454	25,536	98,552	91,668
1996 ^{2, 4}	144,667	132,080	8,207	7,493	29,241	26,697	107,218	97,889
1997 ^{2, 4}	157,539	141,202	10,419	9,339	32,642	29,257	114,478	102,606
1998 ^{2, 4}	169,180	150,115	13,595	12,063	30,572	27,127	125,013	110,925

¹ Character-of-work estimates were made by the National Science Foundation. See: National Science Foundation, *National Patterns of R&D Resources: 1998*, NSF 99-335.

² The character-of-work estimation procedure was revised for 1986 and later years; hence, these data are not directly comparable with data for 1985 and earlier years. See technical notes for details.

³ As a result of a new sample design, statistics for 1988-91 have been revised since originally published. These statistics now better reflect R&D performance among firms in the nonmanufacturing industries and small firms in all industries.

⁴ As a result of the new sample design, statistics for 1991 and later years are not directly comparable with statistics for 1990 and earlier years. See the technical notes for more information.

NOTE: Gross domestic product (GDP) implicit price deflators were used to convert current dollars to constant (1992) dollars.

SOURCE: National Science Foundation/Division of Science Resources Studies, Survey of Industrial Research and Development: 1998

Table A-27. Company and other (except Federal) funds for performance of industrial basic research, applied research, and development, in current and in constant dollars: 1953-98

Page 1 of 2

Year	Total		Basic research		Applied research		Development	
	Current dollars	Constant 1992 dollars	Current dollars	Constant 1992 dollars	Current dollars	Constant 1992 dollars	Current dollars	Constant 1992 dollars
[In millions of dollars]								
1953 ¹	2,200	10,902	132	654	438	2,170	1,630	8,077
1954 ¹	2,320	11,367	143	701	492	2,411	1,685	8,256
1955 ¹	2,460	11,861	162	781	560	2,700	1,738	8,380
1956.....	3,277	15,263	216	1,006	794	3,698	2,267	10,559
1957.....	3,396	15,311	230	1,037	992	4,472	2,174	9,802
1958.....	3,630	15,984	252	1,110	1,137	5,007	2,241	9,868
1959.....	3,983	17,355	248	1,081	1,178	5,133	2,557	11,142
1960.....	4,428	19,029	297	1,276	1,196	5,140	2,935	12,613
1961.....	4,668	19,830	314	1,334	1,165	4,949	3,189	13,547
1962.....	5,029	21,095	345	1,447	1,438	6,032	3,246	13,616
1963.....	5,360	22,222	375	1,555	1,450	6,012	3,535	14,656
1964.....	5,792	23,660	384	1,569	1,560	6,373	3,848	15,719
1965.....	6,445	25,821	406	1,627	1,620	6,490	4,419	17,704
1966.....	7,216	28,111	451	1,757	1,804	7,028	4,961	19,326
1967.....	8,020	30,276	427	1,612	1,849	6,980	5,744	21,684
1968.....	8,869	32,088	462	1,671	2,081	7,529	6,326	22,887
1969.....	9,857	34,060	458	1,583	2,272	7,851	7,127	24,627
1970.....	10,288	33,753	444	1,457	2,378	7,802	7,466	24,495
1971.....	10,654	33,231	456	1,422	2,441	7,614	7,757	24,195
1972.....	11,535	34,515	463	1,385	2,562	7,666	8,510	25,464
1973.....	13,104	37,122	499	1,414	2,832	8,023	9,773	27,686
1974.....	14,667	38,126	536	1,393	3,263	8,482	10,868	28,251
1975.....	15,582	37,021	573	1,361	3,440	8,173	11,569	27,486
1976.....	17,436	39,138	634	1,423	3,912	8,781	12,890	28,934
1977.....	19,340	40,776	701	1,478	4,311	9,089	14,328	30,209
1978 ¹	22,115	43,456	785	1,543	4,870	9,570	16,460	32,344
1979.....	25,708	46,547	893	1,617	5,670	10,266	19,145	34,664
1980 ¹	30,476	50,515	1,035	1,716	6,550	10,857	22,891	37,943
1981.....	35,428	53,671	1,313	1,989	8,359	12,663	25,756	39,018
1982 ¹	40,105	57,154	1,523	2,170	9,363	13,343	29,219	41,640
1983.....	44,588	60,946	1,760	2,406	10,286	14,060	32,542	44,481
1984.....	51,404	67,708	2,132	2,808	11,541	15,202	37,731	49,698
1985.....	57,043	72,638	2,373	3,022	12,908	16,437	41,762	53,180
1986 ²	59,932	74,376	3,496	4,339	15,082	18,717	41,354	51,320
1987 ²	61,403	73,926	3,583	4,314	15,153	18,243	42,667	51,369
1988 ^{2,3}	66,672	77,445	3,507	4,074	16,531	19,202	46,634	54,169
1989 ^{2,3}	73,501	81,923	3,832	4,271	17,993	20,055	51,676	57,597

See explanatory information and SOURCE at end of table.

Table A-27. Company and other (except Federal) funds for performance of industrial basic research, applied research, and development, in current and in constant dollars: 1953-98

Page 2 of 2

Year	Total		Basic research		Applied research		Development	
	Current dollars	Constant 1992 dollars	Current dollars	Constant 1992 dollars	Current dollars	Constant 1992 dollars	Current dollars	Constant 1992 dollars
[In millions of dollars]								
1990 ^{2, 3}	81,602	87,182	3,760	4,017	18,432	19,692	59,410	63,472
1991 ^{2, 3, 4}	90,580	93,074	6,125	6,294	21,425	22,015	63,030	64,766
1992 ^{2, 4}	94,388	94,388	5,816	5,816	21,184	21,184	67,385	67,385
1993 ^{2, 4}	94,591	92,158	5,961	5,808	19,956	19,443	68,678	66,912
1994 ^{2, 4}	97,131	92,426	6,078	5,784	19,372	18,434	71,683	68,211
1995 ^{2, 4}	108,652	101,062	5,379	5,003	23,755	22,096	79,516	73,961
1996 ^{2, 4}	121,015	110,486	6,848	6,252	25,370	23,163	88,798	81,072
1997 ^{2, 4}	133,611	119,755	8,766	7,857	29,782	26,694	95,064	85,206
1998 ^{2, 4}	145,016	128,674	11,701	10,382	27,808	24,674	105,506	93,617

¹ Character-of-work estimates were made by the National Science Foundation. See: National Science Foundation, *National Patterns of R&D Resources: 1998*, Final report, NSF 99-335.

² The character-of-work estimation procedure was revised for 1986 and later years; hence, these data are not directly comparable with data for 1985 and earlier years. See technical notes for details.

³ As a result of a new sample design, statistics for 1988-91 have been revised since originally published. These statistics now better reflect R&D performance among firms in the nonmanufacturing industries and small firms in all industries.

⁴ As a result of the new sample design, statistics for 1991 and later years are not directly comparable with statistics for 1990 and earlier years. See the technical notes for more information.

NOTE: Gross domestic product (GDP) implicit price deflators were used to convert current dollars to constant (1992) dollars.

SOURCE: National Science Foundation/Division of Science Resources Studies, Survey of Industrial Research and Development: 1998

**Table A-28. Federal funds for performance of industrial basic research, applied research, and development,
in current and in constant dollars: 1953-98**

Page 1 of 2

Year	Total		Basic research		Applied research		Development	
	Current dollars	Constant 1992 dollars	Current dollars	Constant 1992 dollars	Current dollars	Constant 1992 dollars	Current dollars	Constant 1992 dollars
[In millions of dollars]								
1953 ¹	1,430	7,086	19	94	288	1,427	1,123	5,565
1954 ¹	1,750	8,574	23	113	322	1,578	1,405	6,884
1955 ¹	2,180	10,511	27	130	368	1,774	1,785	8,607
1956.....	3,328	15,501	37	172	474	2,208	2,817	13,121
1957.....	4,335	19,545	41	185	678	3,057	3,616	16,303
1958.....	4,759	20,956	43	189	774	3,408	3,942	17,358
1959.....	5,635	24,553	72	314	813	3,542	4,750	20,697
1960.....	6,081	26,132	79	339	833	3,580	5,169	22,213
1961.....	6,240	26,508	81	344	812	3,449	5,347	22,715
1962.....	6,434	26,988	143	600	1,011	4,241	5,281	22,152
1963.....	7,270	30,141	147	609	1,007	4,175	6,116	25,357
1964.....	7,720	31,536	165	674	1,040	4,248	6,515	26,614
1965.....	7,740	31,010	186	745	1,038	4,159	6,516	26,106
1966.....	8,332	32,458	173	674	1,039	4,048	7,120	27,737
1967.....	8,365	31,578	202	763	1,066	4,024	7,097	26,791
1968.....	8,560	30,970	180	651	1,043	3,774	7,337	26,545
1969.....	8,451	29,202	160	553	1,015	3,507	7,276	25,142
1970.....	7,779	25,522	158	518	1,049	3,442	6,572	21,562
1971.....	7,666	23,911	134	418	974	3,038	6,558	20,455
1972.....	8,017	23,989	130	389	952	2,849	6,935	20,751
1973.....	8,145	23,074	132	374	993	2,813	7,020	19,887
1974.....	8,220	21,367	163	424	1,025	2,664	7,032	18,279
1975.....	8,605	20,444	157	373	1,130	2,685	7,318	17,387
1976.....	9,561	21,461	185	415	1,200	2,694	8,176	18,352
1977.....	10,485	22,106	210	443	1,325	2,794	8,950	18,870
1978 ¹	11,189	21,987	250	491	1,430	2,810	9,509	18,685
1979.....	12,518	22,665	265	480	1,555	2,815	10,698	19,370
1980 ¹	14,029	23,254	290	481	1,900	3,149	11,839	19,624
1981.....	16,382	24,817	301	456	2,340	3,545	13,741	20,817
1982 ¹	18,545	26,429	381	543	2,960	4,218	15,204	21,667
1983.....	20,680	28,267	463	633	3,641	4,977	16,576	22,657
1984.....	23,396	30,817	476	627	4,224	5,564	18,696	24,626
1985.....	27,196	34,631	489	623	5,347	6,809	21,360	27,200
1986 ²	27,891	34,613	551	684	4,678	5,805	22,662	28,124
1987 ²	30,752	37,024	740	891	4,660	5,610	25,352	30,523
1988 ^{2,3}	30,343	35,246	993	1,153	4,217	4,898	25,133	29,194
1989 ^{2,3}	28,554	31,826	1,384	1,543	4,698	5,236	22,472	25,047

See explanatory information and SOURCE at end of table.

**Table A-28. Federal funds for performance of industrial basic research, applied research, and development,
in current and in constant dollars: 1953-98**

Page 2 of 2

Year	Total		Basic research		Applied research		Development	
	Current dollars	Constant 1992 dollars	Current dollars	Constant 1992 dollars	Current dollars	Constant 1992 dollars	Current dollars	Constant 1992 dollars
[In millions of dollars]								
1990 ^{2, 3}	28,125	30,048	1,368	1,462	6,353	6,787	20,404	21,799
1991 ^{2, 3, 4}	26,372	27,098	1,712	1,759	6,021	6,187	18,639	19,152
1992 ^{2, 4}	24,722	24,722	1,186	1,186	4,983	4,983	18,555	18,555
1993 ^{2, 4}	22,809	22,222	958	933	4,730	4,608	17,118	16,678
1994 ^{2, 4}	22,463	21,375	939	894	4,119	3,919	17,405	16,562
1995 ^{2, 4}	23,451	21,813	720	670	3,699	3,441	19,031	17,702
1996 ^{2, 4}	23,653	21,595	1,358	1,240	3,871	3,534	(S) 18,423	16,820
1997 ^{2, 4}	23,928	21,447	1,654	1,482	2,861	2,564	19,412	17,399
1998 ^{2, 4}	24,164	21,441	1,894	1,681	2,763	2,452	19,507	17,309

¹ Character-of-work estimates were made by the National Science Foundation. See: National Science Foundation, *National Patterns of R&D Resources: 1998*, NSF 99-335.

² The character-of-work estimation procedure was revised for 1986 and later years; hence, these data are not directly comparable with data for 1985 and earlier years. See technical notes for details.

³ As a result of a new sample design, statistics for 1988-91 have been revised since originally published. These statistics now better reflect R&D performance among firms in the nonmanufacturing industries and small firms in all industries.

⁴ As a result of the new sample design, statistics for 1991 and later years are not directly comparable with statistics for 1990 and earlier years. See the technical notes for more information.

KEY: (S) = Indicates imputation of more than 50 percent.

NOTE: Gross domestic product (GDP) implicit price deflators were used to convert current dollars to constant (1992) dollars.

SOURCE: National Science Foundation/Division of Science Resources Studies, Survey of Industrial Research and Development: 1998

Table A-29. Funds for performance of industrial basic research, applied research, and development, by industry and by source of funds 1998

Page 1 of 3

Industry	SIC code	Total			Basic research			Applied research			Development		
		Total	Federal	Company	Total	Federal	Company	Total	Federal	Company	Total	Federal	Company
[In millions of dollars]													
All industries.....		169,180	24,164	145,016	13,595	1,894	11,701	30,572	2,763	27,808	125,013	19,507	105,506
Manufacturing.....		120,401	18,189	102,211	(D)	(D)	7,641	(D)	(D)	21,600	88,899	15,928	72,970
Food, kindred, and tobacco products.....	20,21	1,711	0	1,711	91	0	91	565	0	565	1,055	0	1,055
Textiles and apparel.....	22,23	(D)	(D)	543	46	(D)	(D)	80	0	80	(D)	(D)	(D)
Lumber, wood products, and furniture.....	24,25	374	14	359	48	0	48	(D)	(D)	37	(D)	(D)	274
Paper and allied products.....	26	(D)	(D)	1,583	548	0	548	291	0	291	(D)	(D)	744
Chemicals and allied products.....	28	21,764	(S) 483	21,282	(D)	(D)	3,032	5,772	150	5,622	(D)	(D)	12,628
Industrial chemicals.....	281-82,286	(D)	(D)	6,467	(D)	(D)	720	2,322	125	2,197	(D)	(D)	3,550
Drugs and medicines.....	283	12,571	5	12,566	(D)	(D)	2,183	(D)	(D)	2,730	7,653	0	7,653
Other chemicals.....	284-85,287-89	(D)	(D)	2,249	129	0	129	(D)	(D)	695	(D)	(D)	1,425
Petroleum refining and extraction.....	13,29	1,808	6	1,802	78	2	76	(D)	(D)	757	(D)	(D)	(D)
Rubber products.....	30	(D)	(D)	1,607	155	0	155	(D)	(D)	278	1,174	0	1,174
Stone, clay, and glass products.....	32	(D)	(D)	592	(D)	(D)	(D)	209	0	209	322	(D)	(D)
Primary metals.....	33	(D)	(D)	720	(D)	(D)	(D)	(D)	(D)	201	(D)	(D)	(D)
Ferrous metals and products.....	331-32,3398-99	(D)	(D)	405	(D)	(D)	7	(D)	(D)	132	(D)	(D)	266
Nonferrous metals and products....	333-36	(D)	(D)	315	(D)	(D)	(D)	69	0	69	102	(D)	(D)
Fabricated metal products.....	34	1,595	43	1,551	102	0	102	(D)	(D)	304	(D)	(D)	1,145
Machinery.....	35	14,919	73	14,846	(D)	(D)	642	(D)	(D)	3,942	10,311	49	10,262
Office, computing, and accounting machines.....	357	8,905	15	8,890	(D)	(D)	276	(D)	(D)	3,165	5,452	3	5,449
Other machinery, except electrical.....	351-56,358-59	6,014	58	5,956	(D)	(D)	366	(D)	(D)	777	4,859	46	4,813
Electrical equipment.....	36	25,990	1,613	24,378	(D)	(D)	1,123	5,975	109	5,866	18,809	1,421	17,389
Radio and TV receiving equipment.....	365	155	0	155	34	0	34	11	0	11	110	0	110
Communication equipment.....	366	(D)	(D)	10,173	(D)	(D)	(D)	1,148	0	1,148	(D)	(D)	8,862
Electronic components.....	367	(D)	(D)	9,776	(D)	(D)	(D)	(D)	(D)	4,026	(D)	(D)	5,115
Other electrical equipment.....	361-64,369	4,811	538	4,273	(D)	(D)	291	(D)	(D)	680	3,757	456	3,301

See explanatory information and SOURCE at end of table.

Table A-29. Funds for performance of industrial basic research, applied research, and development, by industry and by source of funds 1998

Page 2 of 3

Industry	SIC code	Total			Basic research			Applied research			Development		
		Total	Federal	Company	Total	Federal	Company	Total	Federal	Company	Total	Federal	Company
[In millions of dollars]													
Transportation equipment.....	37	29,279	10,330	18,948	(D)	(D)	(D)	(D)	(D)	1,439	26,111	9,056	17,055
Motor vehicles and motor vehicles equipment.....	371	(D)	(D)	13,502	(D)	(D)	(D)	(D)	(D)	1,097	(D)	(D)	12,162
Other transportation equipment.....	373-75,379	(D)	(D)	339	(D)	0	(D)	(D)	(D)	70	(D)	(D)	230
Aircraft and missiles.....	372,376	14,449	9,341	5,108	(D)	(D)	172	(D)	(D)	272	12,800	8,136	4,664
Professional and scientific instruments.....	38	(D)	(D)	9,625	(D)	(D)	909	1,734	200	1,533	12,001	4,820	7,182
Scientific and mechanical measuring instruments.....	381-82	(D)	(D)	3,614	359	0	359	876	(S) 175	701	(D)	(D)	2,553
Optical, surgical, photographic, and other instruments.....	384-87	6,085	74	6,011	(D)	(D)	550	858	25	832	(D)	(D)	4,629
Other manufacturing industries ¹	27,31,39	2,795	131	2,664	(D)	(D)	200	585	110	476	2,009	21	1,988
Nonmanufacturing		48,780	5,975	42,805	(D)	(D)	4,060	(D)	(D)	6,208	36,116	3,579	32,536
Transportation and utilities.....	40-42,44-49	(D)	(D)	2,219	(D)	(D)	(D)	(D)	(D)	413	2,124	398	1,727
Communications.....	48	(D)	(D)	1,768	(D)	(D)	(D)	(D)	(D)	293	(D)	(D)	1,419
Telephone communications.....	481	(D)	(D)	1,665	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)
Other communications.....	482-484,489	(D)	(D)	103	22	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)
Electric, gas, and sanitary services.....	49	(D)	(D)	182	13	0	13	44	0	44	(D)	(D)	(D)
Other transportation and utilities.....	40-42,44-47	(D)	(D)	269	(D)	(D)	(D)	77	0	77	183	(D)	(D)
Trade.....	50-59	11,336	(S) 64	11,273	(D)	(D)	620	(D)	(D)	1,528	(D)	(D)	9,125
Finance, insurance, and real estate.....	60-65,67	(D)	(D)	1,623	(D)	(D)	137	33	0	33	1,460	7	1,453
Services.....	701, 72, 73, 75-81,83,84,87,89	29,281	4,889	24,392	(D)	(D)	2,777	4,777	1,263	3,513	(D)	(D)	18,102
Business services.....	73	15,222	540	14,682	(D)	(D)	(D)	1,614	189	1,425	(D)	(D)	12,598
Computer and data processing services.....	737	(D)	(D)	14,297	(D)	(D)	(D)	1,586	189	1,397	12,599	297	12,301
Other business services.....	731-736,738	(D)	(D)	385	61	0	61	27	0	27	(D)	(D)	297

See explanatory information and SOURCE at end of table.

Table A-29. Funds for performance of industrial basic research, applied research, and development, by industry and by source of funds 1998

Page 3 of 3

Industry	SIC code	Total			Basic research			Applied research			Development		
		Total	Federal	Company	Total	Federal	Company	Total	Federal	Company	Total	Federal	Company
[In millions of dollars]													
Health services.....	80	1,207	33	1,173	1,003	11	992	(D)	(D)	101	(D)	(D)	(D)
Offices and clinics of medical doctors, hospitals, medical, and dental labs.....	801,806,807	1,096	21	1,074	986	0	986	(D)	(D)	48	(D)	(D)	(D)
Other health services.....	802–805,808–809	111	12	99	17	11	6	54	1	53	39	0	39
Engineering and management services.....	87	11,835	(S) 3,652	8,182	(D)	(D)	1,048	(D)	(D)	(D)	7,250	(D)	(D)
Engineering, architectural, and surveying.....	871	2,025	1,190	835	(D)	(D)	52	(D)	(D)	(D)	1,223	(D)	(D)
Research, development, and testing.....	873	9,169	(S) 2,388	6,780	(D)	(D)	804	2,337	669	1,667	5,671	1,361	4,309
Other engineering and management services.....	872, 874	641	74	567	(D)	(D)	193	(D)	(D)	(D)	357	(D)	(D)
Other services.....	701,72,75–79,81, 83,84,89	1,017	663	354	(D)	(D)	(D)	(D)	(D)	(D)	751	522	229
Other nonmanufacturing industries ¹	07–12,14,15, 161–162,17	3,830	532	3,298	622	175	447	836	115	721	2,372	241	2,131

¹ Manufacturing companies with fewer than 50 employees and nonmanufacturing companies with fewer than 15 employees were sampled separately without regard to industry classification to minimize year-to-year variation in survey estimates. Estimates for manufacturing companies in this group are combined with those for companies in "Other manufacturing industries." Estimates for nonmanufacturing companies in this group are combined with those for companies in "Other nonmanufacturing industries."

KEY: (D) = Data have been withheld to avoid disclosing operations of individual companies

(S) = Indicates imputation of more than 50 percent.

NOTE: The R&D in this table is the industrial R&D performed within company facilities funded from all sources except the Federal Government. The funds predominantly are the company's own, but also include funds from outside organizations such as other companies, research institutions, universities and colleges, nonprofit organizations, and State governments. Excluded from this table are company-funded R&D not performed within the company (e.g., R&D contracted out to other organizations) and company-funded R&D not performed in the U.S. (e.g., R&D not performed on U.S. soil by foreign subsidiaries or other foreign organizations).

SOURCE: National Science Foundation/Division of Science Resources Studies, Survey of Industrial Research and Development: 1998

Table A-30. Number of companies conducting industrial basic research and total number of R&D-performing companies, by industry and by size of company: 1998

Page 1 of 3

Industry	SIC code			Size of company											
		Total		Fewer than 500 employees		500 to 999 employees		1,000 to 4,999 employees		5,000 to 9,999 employees		10,000 to 24,999 employees		25,000 or more employees	
		Total	Basic	Total	Basic	Total	Basic	Total	Basic	Total	Basic	Total	Basic	Total	Basic
All industries.....		41,923	12,922	38,921	12,029	1,158	424	1,244	322	288	72	183	47	128	27
Manufacturing.....		20,808	5,635	18,731	5,082	731	214	918	217	227	61	132	41	71	19
Food, kindred, and tobacco products.....	20,21	490	244	322	207	53	6	70	16	20	9	13	4	12	2
Textiles and apparel.....	22,23	138	83	51	41	39	33	31	5	7	2	7	2	2	0
Lumber, wood products, and furniture.....	24,25	271	28	216	16	13	7	27	3	11	1	5	1	0	0
Paper and allied products.....	26	285	159	201	151	20	0	39	3	11	2	8	2	6	1
Chemicals and allied products.....	28	706	158	506	55	73	53	81	30	27	10	14	9	5	2
Industrial chemicals.....	281-82,286	149	67	52	2	52	43	27	12	11	5	6	4	1	1
Drugs and medicines.....	283	151	20	109	2	3	1	25	9	5	2	6	5	3	1
Other chemicals.....	284-85,287-89	406	71	345	51	18	8	29	9	11	3	2	0	1	0
Petroleum refining and extraction.....	13,29	126	7	98	0	2	0	5	2	8	0	9	3	3	2
Rubber products.....	30	768	182	613	142	69	23	68	14	11	1	4	1	3	1
Stone, clay, and glass products.....	32	232	119	198	98	4	0	13	7	12	10	5	4	0	0
Primary metals.....	33	158	29	61	0	22	15	50	6	16	4	6	1	3	3
Ferrous metals and products.....	331-32,3398-99	107	11	54	0	2	0	33	6	13	4	4	0	1	1
Nonferrous metals and products.....	333-36	51	18	7	0	20	15	17	0	3	0	2	1	2	2
Fabricated metal products.....	34	1,136	263	973	224	80	21	58	14	12	1	9	2	4	0
Machinery.....	35	1,883	462	1,563	418	147	17	126	18	26	5	18	4	3	0
Office, computing, and accounting machines.....	357	136	15	86	8	22	2	16	4	6	1	5	1	1	0
Other machinery, except electrical.....	351-56,358-59	1,747	447	1,477	411	125	16	110	14	20	4	13	3	2	0
Electrical equipment.....	36	1,124	336	858	285	96	16	125	23	22	6	14	3	9	3
Radio and TV receiving equipment....	365	15	5	11	4	1	0	3	1	0	0	0	0	0	0
Communication equipment.....	366	103	13	65	5	12	2	17	4	5	1	0	0	4	1
Electronic components.....	367	600	227	467	205	52	8	64	11	10	2	5	1	1	0
Other electrical equipment.....	361-64,369	406	92	314	71	31	7	41	7	7	3	9	2	4	2

See explanatory information and SOURCE at end of table.

Table A-30. Number of companies conducting industrial basic research and total number of R&D-performing companies, by industry and by size of company: 1998

Page 2 of 3

Industry	SIC code	Total		Size of company											
				Fewer than 500 employees		500 to 999 employees		1,000 to 4,999 employees		5,000 to 9,999 employees		10,000 to 24,999 employees		25,000 or more employees	
		Total	Basic	Total	Basic	Total	Basic	Total	Basic	Total	Basic	Total	Basic	Total	Basic
Transportation equipment.....	37	542	112	387	50	3	1	109	51	21	4	7	2	14	4
Motor vehicles and motor vehicles equipment.....	371	316	53	190	0	1	0	99	49	14	1	6	2	5	1
Other transportation equipment.....	373-75,379	203	52	195	49	1	1	4	1	1	1	0	0	2	0
Aircraft and missiles.....	372,376	23	7	2	1	1	0	6	1	6	2	1	0	7	3
Professional and scientific instruments...	38	655	148	498	115	63	10	72	16	13	5	5	1	4	1
Scientific and mechanical measuring instruments.....	381-82	355	67	286	56	33	5	27	5	4	1	3	0	2	0
Optical, surgical, photographic, and other instruments.....	384-87	299	81	211	59	30	5	45	11	9	4	2	1	2	1
Other manufacturing industries ¹	27,31,39	12,295	3,303	12,186	3,279	47	11	42	10	9	1	7	2	3	0
Nonmanufacturing.....		21,115	7,287	20,191	6,947	428	210	327	105	61	12	52	6	57	8
Transportation and utilities.....	40-42,44-49	324	119	176	99	60	1	41	7	18	6	13	3	16	3
Communications.....	48	113	52	100	49	1	0	2	0	0	0	1	0	9	3
Telephone communications.....	481	60	2	51	0	0	0	0	0	0	0	1	0	8	2
Other communications.....	482-484,489	53	50	49	49	1	0	2	0	0	0	0	0	1	1
Electric, gas, and sanitary services....	49	110	11	4	0	54	1	27	4	16	5	9	2	1	0
Other transportation and utilities.....	40-42,44-47	101	55	72	50	6	0	12	3	2	1	3	1	6	0
Trade.....	50-59	3,752	1,267	3,368	1,054	222	151	127	56	8	3	6	0	21	3
Finance, insurance, and real estate.....	60-65,67	392	81	332	54	7	2	31	23	6	0	9	0	8	2
Services.....	701,72,73,75-81, 83,84,87,89	6,170	1,569	5,886	1,511	117	36	113	17	20	2	23	3	11	0
Business services.....	73	3,448	736	3,279	700	76	23	65	11	13	2	8	1	8	0
Computer and data processing services.....	737	3,069	530	2,924	498	72	21	53	10	10	2	5	0	4	0
Other business services.....	731-736,738	380	206	354	202	4	2	11	1	3	0	3	1	4	0

See explanatory information and SOURCE at end of table.

Table A-30. Number of companies conducting industrial basic research and total number of R&D-performing companies, by industry and by size of company: 1998

Page 3 of 3

Industry	SIC code	Total		Size of company													
				Fewer than 500 employees		500 to 999 employees		1,000 to 4,999 employees		5,000 to 9,999 employees		10,000 to 24,999 employees		25,000 or more employees			
		Total	Basic	Total	Basic	Total	Basic	Total	Basic	Total	Basic	Total	Basic	Total	Basic	Total	Basic
Health services.....	80	482	140	475	139	1	0	3	1	1	0	2	0	0	0	0	0
Offices and clinics of medical doctors, hospitals, medical and dental labs.....	801,806,807	365	100	361	100	1	0	1	0	0	0	2	0	0	0	0	0
Other health services.....	802-805,808-809	118	40	115	39	0	0	2	1	1	0	0	0	0	0	0	0
Engineering and management services.....	87	1,776	447	1,704	431	36	12	26	4	4	0	4	0	2	0	2	0
Engineering, architectural, and surveying.....	871	491	114	453	108	13	3	20	3	2	0	3	0	0	0	0	0
Research, development, and testing.....	873	940	286	930	279	8	7	1	0	0	0	0	0	1	0	1	0
Other engineering and management services.....	872,874	345	47	321	44	14	2	5	1	2	0	1	0	1	0	1	0
Other services.....	701,72,75-79,81, 83,84,89	464	246	428	242	4	1	20	1	2	0	9	2	1	0	1	0
Other nonmanufacturing industries ¹	07-12,14,15, 161-162,17	10,477	4,252	10,429	4,229	22	20	15	2	9	1	1	0	1	0	1	0

¹ Manufacturing companies with fewer than 50 employees and nonmanufacturing companies with fewer than 15 employees were sampled separately without regard to industry classification to minimize year-to-year variation in survey estimates. Estimates for manufacturing companies in this group are combined with those for companies in "Other manufacturing industries." Estimates for nonmanufacturing companies in this group are combined with those for companies in "Other nonmanufacturing industries."

SOURCE: National Science Foundation/Division of Science Resources Studies, Survey of Industrial Research and Development: 1998

Table A-31. Total (company, Federal, and other) funds for industrial energy R&D performance, by industry and by size of company: 1988–98 and projected 1999

Page 1 of 4

Industry and size of company	SIC code	1988 ³	1989 ³	1990 ³	1991 ^{3, 5}	1992 ⁵	1993 ⁵	1994 ⁵	1995 ⁵	1996 ^{4, 5}	1997 ⁵	1998 ⁵	Projected 1999
[In millions of dollars]													
Distribution by industry:													
All industries.....		3,706	3,789	4,004	4,615	3,225	2,747	2,549	2,330	2,184	1,640	1,800	1,605
Manufacturing.....		3,155	3,175	3,274	3,918	2,631	2,111	1,740	1,797	1,763	1,269	1,431	1,209
Food, kindred, and tobacco products.....	20,21	(3)	(D)	(D)	(D)	(D)	0	(D)	(D)	0	(D)	(D)	(D)
Textiles and apparel.....	22,23	(D)	(D)	(D)	0	0	0	0	0	0	0	0	0
Lumber, wood products, and furniture.....	24,25	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	0	0	0
Paper and allied products.....	26	1	(D)	(D)	(D)	1	(D)	(D)	(D)	(D)	(D)	(D)	(D)
Chemicals and allied products.....	28	(S)	111	417	(D)	72	(D)	(D)	(D)	(D)	(D)	(D)	(D)
Industrial chemicals.....	281–82,286	(D)	108	414	(D)	66	(D)	(D)	(D)	(D)	(D)	(D)	(D)
Drugs and medicines.....	283	(D)	(D)	(D)	(D)	0	0	0	0	0	0	(D)	(D)
Other chemicals.....	284–85,287–89	4	(D)	(D)	(D)	0	(D)	2	2	2	6	(D)	(D)
Petroleum refining and extraction.....	13,29	1,056	1,128	1,177	1,416	1,150	798	(D)	(D)	(D)	387	408	264
Rubber products.....	30	(D)	(D)	(D)	(D)	(D)	2	(D)	(D)	(D)	(D)	(D)	(D)
Stone, clay, and glass products.....	32	(D)	1	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)
Primary metals.....	33	21	(D)	(D)	26	3	17	68	(D)	(D)	(D)	(D)	(D)
Ferrous metals and products.....	331–32,3398–99	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)
Nonferrous metals and products.....	333–36	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	0	0
Fabricated metal products.....	34	(D)	14	49	2	(D)	(D)	1	(D)	(D)	(D)	0	0
Machinery.....	35	244	260	254	(S)	154	(D)	(D)	(D)	(D)	(D)	56	32
Office, computing, and accounting machines.....	357	(D)	(D)	0	(D)	(D)	0	0	0	0	0	0	0
Other machinery, except electrical.....	351–56,358–59	(D)	(D)	235	(D)	(D)	(D)	(D)	(D)	(D)	(D)	56	32
Electrical equipment.....	36	680	647	627	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)
Radio and TV receiving equipment.....	365	0	0	0	0	0	0	0	0	0	0	0	0
Communication equipment.....	366	(D)	(D)	(D)	(D)	(D)	(D)	12	(D)	(D)	(D)	(D)	(D)
Electronic components.....	367	(D)	(D)	(D)	(D)	(D)	8	14	(D)	(D)	(D)	0	(D)
Other electrical equipment.....	361–64,369	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)

See explanatory information and SOURCE at end of table.

Table A-31. Total (company, Federal, and other) funds for industrial energy R&D performance, by industry and by size of company: 1988–98 and projected 1999

Page 2 of 4

Industry and size of company	SIC code	1988 ³	1989 ³	1990 ³	1991 ^{3,5}	1992 ⁵	1993 ⁵	1994 ⁵	1995 ⁵	1996 ^{4,5}	1997 ⁵	1998 ⁵	Projected 1999
[In millions of dollars]													
Distribution by industry:													
Transportation equipment.....	37	(D)	847	863	(S)	(D)	(D)	(D)	(D)	(D)	(D)	680	(D)
Motor vehicles and motor vehicles equipment.....	371	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)
Other transportation equipment....	373-75,379	(D)	(D)	(D)	0	0	0	0	0	0	0	0	0
Aircraft and missiles.....	372,376	652	577	626	(D)	478	381	(D)	(D)	(D)	(D)	(D)	(D)
Professional and scientific instruments.....	38	16	12	11	(S)	(S)	(D)	(D)	(D)	0	1	(D)	0
Scientific and mechanical measuring instruments.....	381-82	(D)	(D)	(D)	(D)	(D)	0	(D)	0	0	1	0	0
Optical, surgical, photographic, and other instruments.....	384-87	(D)	(D)	(D)	(D)	(D)	(D)	(D)	0	0	(D)	0	0
Other manufacturing industries ¹	27,31,39	0	(D)	(D)	(D)	0	0	0	(D)	0	0	0	0
Nonmanufacturing ²		551	614	730	697	594	636	809	533	421	371	370	(S) 396
Transportation and utilities.....	40-42,44-49	NA	NA	NA	NA	NA	NA	NA	106	100	(D)	(D)	53
Communications.....	48	NA	NA	NA	NA	NA	NA	NA	0	0	0	0	0
Telephone communications....	481	NA	NA	NA	NA	NA	NA	NA	0	0	0	0	0
Other communications.....	482-484,489	NA	NA	NA	NA	NA	NA	NA	0	0	0	0	0
Electric, gas, and sanitary services.....	49	NA	NA	NA	NA	NA	NA	NA	106	(D)	(D)	(D)	53
Other transportation and utilities..	40-42,44-47	NA	NA	NA	NA	NA	NA	NA	0	(D)	(D)	(D)	0
Trade.....	50-59	NA	NA	NA	NA	NA	NA	NA	(D)	(D)	0	0	0
Finance, insurance, and real estate..	60-65,67	NA	NA	NA	NA	NA	NA	NA	0	0	0	0	0
Services.....	701,72,73,75-81, 83,84,87,89	NA	NA	NA	NA	NA	NA	NA	(S) 218	94	169	77	(D)
Business services.....	73	NA	NA	NA	NA	NA	NA	NA	0	0	(D)	0	0
Computer and data processing services.....	737	NA	NA	NA	NA	NA	NA	NA	0	0	0	0	0
Other business services.....	731-736,738	NA	NA	NA	NA	NA	NA	NA	0	0	(D)	0	0

See explanatory information and SOURCE at end of table.

Table A-31. Total (company, Federal, and other) funds for industrial energy R&D performance, by industry and by size of company: 1988–98 and projected 1999

Page 3 of 4

Industry and size of company	SIC code	1988 ³	1989 ³	1990 ³	1991 ^{3,5}	1992 ⁵	1993 ⁵	1994 ⁵	1995 ⁵	1996 ^{4,5}	1997 ⁵	1998 ⁵	Projected 1999
[In millions of dollars]													
Distribution by industry:													
Health services.....	80	NA	NA	NA	NA	NA	NA	NA	(D)	(D)	0	0	0
Offices and clinics of medical doctors, hospitals, medical and dental labs.....	801,806,807	NA	NA	NA	NA	NA	NA	NA	(D)	(D)	0	0	0
Other health services.....	802-805,808-809	NA	NA	NA	NA	NA	NA	NA	0	0	0	0	0
Engineering and management services.....	87	NA	NA	NA	NA	NA	NA	NA	(D)	(D)	(D)	77	(D)
Engineering, architectural, and surveying.....	871	NA	NA	NA	NA	NA	NA	NA	93	80	98	(D)	(D)
Research, development, and testing.....	873	NA	NA	NA	NA	NA	NA	NA	(D)	(D)	(D)	(D)	(D)
Other engineering and management services.....	872,874	NA	NA	NA	NA	NA	NA	NA	0	0	0	0	0
Other services.....	701,72,75-79,81, 83,84,89	NA	NA	NA	NA	NA	NA	NA	0	0	0	0	0
Other nonmanufacturing industries ¹	07-12,14,15, 161-162,17	NA	NA	NA	NA	NA	NA	NA	(D)	(D)	(D)	(D)	(D)

See explanatory information and SOURCE at end of table.

Table A-31. Total (company, Federal, and other) funds for industrial energy R&D performance, by industry and by size of company: 1988–98 and projected 1999

Page 4 of 4

Industry and size of company	SIC code	1988 ³	1989 ³	1990 ³	1991 ^{3, 5}	1992 ⁵	1993 ⁵	1994 ⁵	1995 ⁵	1996 ^{4, 5}	1997 ⁵	1998 ⁵	Projected 1999
[In millions of dollars]													
Distribution by size of company: [Number of employees]													
Total.....		NA	NA	NA	NA	NA	NA	2,549	2,330	2,184	1,640	1,800	1,605
Fewer than 500.....		NA	NA	NA	NA	NA	NA	28	39	39	101	42	(D)
500 to 999.....		NA	NA	NA	NA	NA	NA	86	22	24	11	(D)	(D)
1,000 to 4,999.....		NA	NA	NA	NA	NA	NA	76	45	24	112	50	19
5,000 to 9,999.....		NA	NA	NA	NA	NA	NA	48	48	47	10	72	(D)
10,000 to 24,999.....		NA	NA	NA	NA	NA	NA	782	749	640	437	494	335
25,000 or more.....		NA	NA	NA	NA	NA	NA	1,529	1,427	1,410	971	1,140	1,194

¹ Beginning in 1996, manufacturing companies with fewer than 50 employees and nonmanufacturing companies with fewer than 15 employees were sampled separately without regard to industry classification to minimize year-to-year variation in survey estimates. Estimates for manufacturing companies in this group are combined with those for companies in "Other manufacturing industries." Estimates for nonmanufacturing companies in this group are combined with those for companies in "Other nonmanufacturing industries." As a result, statistics for "Other manufacturing industries" and for "Other nonmanufacturing industries" after 1995 are not comparable with statistics for prior years.

² Until 1995, data were not broken down below this level of detail for most nonmanufacturing industries.

³ As a result of a new sample design, statistics for 1988–91 have been revised since originally published. These statistics now better reflect R&D performance among firms in the nonmanufacturing industries and small firms in all industries.

⁴ Total (company, Federal, and other) funds for industrial energy R&D performance were not collected in 1996. As a result, the published 1996 data are the projected 1996 data as collected in 1995.

⁵ As a result of the new sample design, statistics for 1991 and later years are not directly comparable with statistics for 1990 and earlier years. See the technical notes for more information.

KEY: (D) = Data have been withheld to avoid disclosing operations of individual companies.

(S) = Indicates imputation of more than 50 percent. For years prior to 1993, data have been withheld.

NA = Not available.

NOTES: Energy R&D data are collected only on Form RD-1, the questionnaire sent to larger R&D-performing companies. Consequently, the universe of companies that perform energy R&D may not be represented by the statistics in this table. See the technical notes in Section B for more information on Form RD-1 and Form RD-1A.

SOURCE: National Science Foundation/Division of Science Resources Studies, Survey of Industrial Research and Development: 1998

Table A-32. Company and other (except Federal) funds for industrial energy R&D performance, by selected industry: 1988–98 and projected 1999

Industry	SIC code	1988 ¹	1989 ¹	1990 ¹	1991 ^{1,3}	1992 ³	1993 ³	1994 ³	1995 ³	1996 ^{2,3}	1997 ³	1998 ³	Projected 1999 ³
[In millions of dollars]													
Total.....		2,317	2,418	2,558	2,691	2,084	1,694	1,660	1,360	1,306	884	1,107	935
Chemicals and allied products.....	28	59	97	412	(D)	(D)	(D)	(D)	35	35	46	(D)	(D)
Petroleum refining and extraction.....	13,29	1,050	1,124	1,174	1,409	1,143	790	596	646	617	387	408	264
Machinery.....	35	229	246	220	(S)	146	177	270	108	110	78	56	32
Electrical equipment.....	36	123	92	90	101	159	114	174	(D)	(D)	(D)	(D)	(D)
Aircraft and missiles.....	372,376	211	160	199	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)
All other manufacturing industries.....		450	451	173	(S)	41	24	73	30	33	27	81	67
Nonmanufacturing industries	07-10,12-17, 40-42,44-49, 50-59,60-65,67, 701,73,75-76, 78-79,80-81, 83-84,87,89	195	248	290	274	281	403	449	398	(D)	269	327	(D)

¹ As a result of a new sample design, statistics for 1988–91 have been revised since originally published. These statistics now better reflect R&D performance among firms in the nonmanufacturing industries and small firms in all industries.

² Total (company, Federal, and other) funds for industrial energy R&D performance were not collected in 1996. As a result, the published 1996 data are the projected 1996 data as collected in 1995.

³ As a result of the new sample design, statistics for 1991 and later years are not directly comparable with statistics for 1990 and earlier years. See the technical notes for more information.

KEY: (D) = Data have been withheld to avoid disclosing operations of individual companies.

(S) = Indicates imputation of more than 50 percent. For years prior to 1993, data have been withheld.

NOTES: Energy R&D data are collected only on Form RD-1, the questionnaire sent to larger R&D-performing companies. Consequently, the universe of companies that perform energy R&D may not be represented by the statistics in this table. See the technical notes in Section B for more information on Form RD-1 and Form RD-1A.

SOURCE: National Science Foundation/Division of Science Resources Studies, Survey of Industrial Research and Development: 1998

Table A-33. Federal funds for industrial energy R&D performance, by selected industry: 1988–98 and projected 1999

Industry	SIC code	1988 ¹	1982 ¹	1990 ¹	1991 ^{1,3}	1992 ³	1993 ³	1994 ³	1995 ³	1996 ^{2,3}	1997 ³	1998 ³	Projected 1999 ³	
[In millions of dollars]														
Total.....		1,389	1,371	1,446	1,924	1,141	1,053	888	970	878	756	694	670	
Chemicals and allied products.....	28	13	14	5	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	
Petroleum refining and extraction.....	13,29	6	4	3	6	7	8	(D)	(D)	(D)	0	0	0	
Machinery.....	35	15	14	34	(S)	(D)	(D)	(D)	(D)	(D)	(D)	0	0	
Electrical equipment.....	36	557	555	537	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	
Aircraft and missiles.....	372,376	441	417	427	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	
All other manufacturing industries.....		1	0	2	1	2	2		1	1	0	2	2	
Nonmanufacturing industries	07-10, 12-17, 40-42, 44-49, 50-59, 60-65, 67, 701, 73, 75-76, 78-79, 80-81, 83-84, 87, 89	356	367	438	423	313	233	359	(S) 134	49	102	43	(D)	

¹ As a result of a new sample design, statistics for 1988–91 have been revised since originally published. These statistics now better reflect R&D performance among firms in the nonmanufacturing industries and small firms in all industries.

² Total (company, Federal, and other) funds for industrial energy R&D performance were not collected in 1996. As a result, the published 1996 data are the projected 1996 data as collected in 1995.

³ As a result of the new sample design, statistics for 1991 and later years are not directly comparable with statistics for 1990 and earlier years. See the technical notes for more information.

KEY: (D) = Data have been withheld to avoid disclosing operations of individual companies.

(S) = Indicates imputation of more than 50 percent. For years prior to 1993, data have been withheld.

NOTES: Energy R&D data are collected only on Form RD-1, the questionnaire sent to larger R&D-performing companies. Consequently, the universe of companies that perform energy R&D may not be represented by the statistics in this table. See the technical notes in Section B for more information on Form RD-1 and Form RD-1A.

SOURCE: National Science Foundation/Division of Science Resources Studies, Survey of Industrial Research and Development: 1998

Table A-34. Total (company, Federal, and other) funds for industrial energy R&D and projected 1999

Primary energy source	1988 ¹	1989 ¹	1990 ¹	1991 ^{1,3}	1992 ³	1993 ³	1994 ³	1995 ³	1996 ^{2,3}	1997 ³	1998 ³	Projected 1999 ³
[In millions of dollars]												
Total.....	3,706	3,789	4,004	4,615	3,225	2,747	2,549	2,330	2,184	1,640	1,800	1,605
Fossil fuels.....	1,583	1,652	1,879	2,128	1,498	1,082	966	811	838	752	968	862
Oil.....	NA	(S)	NA	(S)	NA	693	NA	608	627	328	NA	NA
Gas.....	NA	(S)	NA	(S)	NA	215	NA	124	104	150	NA	NA
Shale.....	NA	77	NA	(S)	NA	(D)	NA	0	0	(D)	NA	NA
Coal.....	NA	(S)	NA	(S)	NA	97	NA	62	(D)	155	NA	NA
Synthetic fossil fuels.....	NA	17	NA	(S)	NA	23	NA	(D)	(D)	37	NA	NA
Mining.....	NA	(S)	NA	(S)	NA	(D)	NA	3	(D)	31	NA	NA
Other.....	NA	(S)	NA	(S)	NA	(D)	NA	(D)	(D)	87	NA	NA
Other fossil fuels.....	NA	(S)	NA	58	NA	(D)	NA	17	(D)	(D)	NA	NA
Nuclear.....	1,098	919	973	1,139	849	818	(D)	255	160	86	(D)	(D)
Fission.....	NA	856	NA	1,134	NA	(D)	NA	(D)	(D)	58	NA	NA
Fusion.....	NA	63	NA	5	NA	(D)	NA	(D)	(D)	28	NA	NA
Total geothermal, solar, and conservation and utilization.....	492	612	(D)	866	608	442	469	380	353	149	(D)	(D)
Geothermal.....	NA	(D)	NA	(S)	NA	90	NA	(D)	(D)	(D)	NA	NA
Solar.....	NA	(D)	NA	(S)	NA	59	NA	(D)	(D)	(D)	NA	NA
Conservation and utilization.....	NA	391	NA	(S)	NA	293	NA	219	201	101	NA	NA
All other energy.....	533	606	681	507	271	404	(D)	884	833	652	611	528

¹As a result of a new sample design, statistics for 1988–91 have been revised since originally published. These statistics now better reflect R&D performance among firms in the nonmanufacturing industries and small firms in all industries.

²Total (company, Federal, and other) funds for industrial energy R&D performance were not collected in 1996. As a result, the published 1996 data are the projected 1996 data as collected in 1995.

³As a result of the new sample design, statistics for 1991 and later years are not directly comparable with statistics for 1990 and earlier years. See the technical notes for more information.

KEY: (D) = Data have been withheld to avoid disclosing operations of individual companies.

(S) = Indicates imputation of more than 50 percent. For years prior to 1993, data have been withheld.

NA = Not available.

NOTES: Energy R&D data are collected only on Form RD-1, the questionnaire sent to larger R&D-performing companies. Consequently, the universe of companies that perform energy R&D may not be represented by the statistics in this table. See the technical notes in Section B for more information on Form RD-1 and Form RD-1A.

SOURCE: National Science Foundation/Division of Science Resources Studies, Survey of Industrial Research and Development: 1998

Table A-35. Company and other (except Federal) funds for industrial energy R&D performance, by primary energy source: 1988–98 and projected 1999

Primary energy source	1988 ¹	1989 ¹	1990 ¹	1991 ^{1,3}	1992 ³	1993 ³	1994 ³	1995 ³	1996 ^{2,3}	1997 ³	1998 ³	Projected 1999 ³
[In millions of dollars]												
Total.....	2,317	2,418	2,558	2,691	2,084	1,694	1,660	1,360	1,306	884	1,107	935
Fossil fuels.....	1,519	1,485	1,704	1,869	1,414	1,003	874	787	816	679	910	815
Oil.....	NA	(S)	NA	(S)	NA	(D)	NA	(D)	623	(D)	NA	NA
Gas.....	NA	(S)	NA	(S)	NA	210	NA	(D)	(D)	146	NA	NA
Shale.....	NA	(S)	NA	(S)	NA	0	NA	0	0	(D)	NA	NA
Coal.....	NA	(S)	NA	(S)	NA	57	NA	43	73	123	NA	NA
Synthetic fossil fuels.....	NA	(D)	NA	(S)	NA	(D)	NA	(D)	(D)	(D)	NA	NA
Mining.....	NA	(D)	NA	(D)	NA	0	NA	3	(D)	17	NA	NA
Other.....	NA	(S)	NA	(D)	NA	(D)	NA	(D)	(D)	(D)	NA	NA
Other fossil fuels.....	NA	(S)	NA	(S)	NA	(D)	NA	(D)	(D)	(D)	NA	NA
Nuclear.....	117	39	72	46	72	58	(D)	(D)	(D)	47	(D)	(D)
Fission.....	NA	27	NA	45	NA	(D)	NA	63	(D)	(D)	NA	NA
Fusion.....	NA	12	NA	1	NA	(D)	NA	(D)	(D)	(D)	NA	NA
Total geothermal, solar, and conservation and utilization.....	314	416	278	478	474	307	300	245	226	(D)	(D)	(D)
Geothermal.....	NA	(D)	NA	(S)	NA	(D)	NA	(D)	(D)	(D)	NA	NA
Solar.....	NA	(D)	NA	(S)	NA	(D)	NA	14	(D)	(D)	NA	NA
Conservation and utilization.....	NA	384	NA	(S)	NA	203	NA	(D)	(D)	(D)	NA	NA
All other energy.....	367	478	504	298	124	325	(D)	(D)	(D)	(D)	(D)	(D)

¹ As a result of a new sample design, statistics for 1988–91 have been revised since originally published. These statistics now better reflect R&D performance among firms in the nonmanufacturing industries and small firms in all industries.

² Total (company, Federal, and other) funds for industrial energy R&D performance were not collected in 1996. As a result, the published 1996 data are the projected 1996 data as collected in 1995.

³ As a result of the new sample design, statistics for 1991 and later years are not directly comparable with statistics for 1990 and earlier years. See the technical notes for more information.

KEY: (D) = Data have been withheld to avoid disclosing operations of individual companies.

(S) = Indicates imputation of more than 50 percent. For years prior to 1993, data have been withheld.

NA = Not available.

NOTES: Energy R&D data are collected only on Form RD-1, the questionnaire sent to larger R&D-performing companies. Consequently, the universe of companies that perform energy R&D may not be represented by the statistics in this table. See the technical notes in Section B for more information on Form RD-1 and Form RD-1A.

SOURCE: National Science Foundation/Division of Science Resources Studies, Survey of Industrial Research and Development: 1998

Table A-36. Federal funds for industrial energy R&D performance, by primary energy source: 1988–98 and projected 1999

Primary energy source	1988 ¹	1989 ¹	1990 ¹	1991 ^{1,3}	1992 ³	1993 ³	1994 ³	1995 ³	1996 ^{2,3}	1997 ³	1998 ³	Projected 1999 ³
[In millions of dollars]												
Total.....	1,389	1,371	1,446	1,924	1,141	1,053	888	970	878	756	694	670
Fossil fuels.....	63	(D)	(D)	(S)	84	79	92	24	22	73	58	46
Oil.....	NA	(S)	NA	(S)	NA	(D)	NA	(D)	4	(D)	NA	NA
Gas.....	NA	(S)	NA	(S)	NA	5	NA	(D)	(D)	4	NA	NA
Shale.....	NA	(S)	NA	(S)	NA	(D)	NA	0	0	(D)	NA	NA
Coal.....	NA	(S)	NA	(S)	NA	40	NA	19	(D)	32	NA	NA
Synthetic fossil fuels.....	NA	(D)	NA	(S)	NA	(D)	NA	(D)	(D)	(D)	NA	NA
Mining.....	NA	(D)	NA	(D)	NA	(D)	NA	0	0	14	NA	NA
Other.....	NA	(S)	NA	(D)	NA	(S)	NA	(D)	(D)	(D)	NA	NA
Other fossil fuels.....	NA	(S)	NA	(S)	NA	(D)	NA	(D)	(D)	(D)	NA	NA
Nuclear.....	979	859	885	1,093	776	759	536	(D)	(D)	39	(D)	(D)
Fission.....	NA	809	NA	1,089	NA	(D)	NA	(D)	(D)	(D)	NA	NA
Fusion.....	NA	50	NA	4	NA	(D)	NA	(D)	(D)	(D)	NA	NA
Total geothermal, solar, and conservation and utilization.....	178	(D)	(D)	(S)	135	136	169	135	127	(D)	(D)	(D)
Geothermal.....	NA	(D)	NA	11	NA	(D)	NA	(D)	(D)	7	NA	NA
Solar.....	NA	(D)	NA	38	NA	(D)	NA	(D)	(D)	(D)	NA	NA
Conservation and utilization.....	NA	(D)	NA	(S)	NA	(S)	NA	(D)	(D)	(D)	NA	NA
All other energy.....	165	(D)	174	(S)	146	79	(S) 91	(D)	(D)	(D)	(D)	(D)

¹ As a result of a new sample design, statistics for 1988–91 have been revised since originally published. These statistics now better reflect R&D performance among firms in the nonmanufacturing industries and small firms in all industries.

² Total (company, Federal, and other) funds for industrial energy R&D performance were not collected in 1996. As a result, the published 1996 data are the projected 1996 data as collected in 1995.

³ As a result of the new sample design, statistics for 1991 and later years are not directly comparable with statistics for 1990 and earlier years. See the technical notes for more information.

KEY: (D) = Data have been withheld to avoid disclosing operations of individual companies.

(S) = Indicates imputation of more than 50 percent. For years prior to 1993, data have been withheld.

NA = Not available.

NOTES: Energy R&D data are collected only on Form RD-1, the questionnaire sent to larger R&D-performing companies. Consequently, the universe of companies that perform energy R&D may not be represented by the statistics in this table. See the technical notes in Section B for more information on Form RD-1 and Form RD-1A.

SOURCE: National Science Foundation/Division of Science Resources Studies, Survey of Industrial Research and Development: 1998

Table A-37. Number of companies performing industrial energy R&D and total number of R&D-performing companies, by industry and by size of company: 1998

Page 1 of 3

Industry	SIC code	Total		Size of company											
				Fewer than 500 employees		500 to 999 employees		1,000 to 4,999 employees		5,000 to 9,999 employees		10,000 to 24,999 employees		25,000 or more employees	
		Total	Energy	Total	Energy	Total	Energy	Total	Energy	Total	Energy	Total	Energy	Total	Energy
All Industries.....		41,923	57	38,921	5	1,158	3	1,244	12	288	8	183	18	128	11
Manufacturing.....		20,808	44	18,731	3	731	2	918	10	227	6	132	14	71	9
Food, kindred, and tobacco products.....	20,21	490	1	322	0	53	0	70	0	20	0	13	1	12	0
Textiles and apparel.....	22,23	138	0	51	0	39	0	31	0	7	0	7	0	2	0
Lumber, wood products, and furniture.....	24,25	271	0	216	0	13	0	27	0	11	0	5	0	0	0
Paper and allied products.....	26	285	2	201	0	20	0	39	0	11	1	8	0	6	1
Chemicals and allied products.....	28	706	6	506	0	73	0	81	3	27	1	14	1	5	1
Industrial chemicals.....	281-82,286	149	2	52	0	52	0	27	0	11	0	6	1	1	1
Drugs and medicines.....	283	151	1	109	0	3	0	25	1	5	0	6	0	3	0
Other chemicals.....	284-85,287-89	406	3	345	0	18	0	29	2	11	1	2	0	1	0
Petroleum refining and extraction.....	13,29	126	7	98	0	2	0	5	0	8	0	9	6	3	1
Rubber products.....	30	768	2	613	0	69	1	68	0	11	1	4	0	3	0
Stone, clay, and glass products.....	32	232	2	198	0	4	1	13	0	12	0	5	1	0	0
Primary metals.....	33	158	3	61	0	22	0	50	0	16	1	6	1	3	1
Ferrous metals and products.....	331-32,3398-99	107	3	54	0	2	0	33	0	13	1	4	1	1	1
Nonferrous metals and products.....	333-36	51	0	7	0	20	0	17	0	3	0	2	0	2	0
Fabricated metal products.....	34	1,136	0	973	0	80	0	58	0	12	0	9	0	4	0
Machinery.....	35	1,883	9	1,563	0	147	0	126	5	26	1	18	2	3	1
Office, computing, and accounting machines.....	357	136	0	86	0	22	0	16	0	6	0	5	0	1	0
Other machinery, except electrical.....	351-56,358-59	1,747	9	1,477	0	125	0	110	5	20	1	13	2	2	1
Electrical equipment.....	36	1,124	6	858	2	96	0	125	2	22	0	14	1	9	1
Radio and TV receiving equipment....	365	15	0	11	0	1	0	3	0	0	0	0	0	0	0
Communication equipment.....	366	103	3	65	1	12	0	17	2	5	0	0	0	4	0
Electronic components.....	367	600	1	467	1	52	0	64	0	10	0	5	0	1	0
Other electrical equipment.....	361-64,369	406	2	314	0	31	0	41	0	7	0	9	1	4	1

See explanatory information and SOURCE at end of table.

Table A-37. Number of companies performing industrial energy R&D and total number of R&D-performing companies, by industry and by size of company: 1998

Page 2 of 3

Industry	SIC code	Total		Size of company											
				Fewer than 500 employees		500 to 999 employees		1,000 to 4,999 employees		5,000 to 9,999 employees		10,000 to 24,999 employees		25,000 or more employees	
		Total	Energy	Total	Energy	Total	Energy	Total	Energy	Total	Energy	Total	Energy	Total	Energy
Transportation equipment.....	37	542	5	387	0	3	0	109	0	21	1	7	1	14	3
Motor vehicles and motor vehicles equipment.....	371	316	1	190	0	1	0	99	0	14	0	6	1	5	0
Other transportation equipment.....	373-75,379	203	0	195	0	1	0	4	0	1	0	0	0	2	0
Aircraft and missiles.....	372,376	23	4	2	0	1	0	6	0	6	1	1	0	7	3
Professional and scientific instruments....	38	655	1	498	1	63	0	72	0	13	0	5	0	4	0
Scientific and mechanical measuring instruments.....	381-82	355	0	286	0	33	0	27	0	4	0	3	0	2	0
Optical, surgical, photographic, and other instruments.....	384-87	299	1	211	1	30	0	45	0	9	0	2	0	2	0
Other manufacturing industries ¹	27,31,39	12,295	0	12,186	0	47	0	42	0	9	0	7	0	3	0
Nonmanufacturing		21,115	13	20,191	2	428	1	327	2	61	2	52	4	57	2
Transportation and Utilities.....	40-42,44-49	324	6	176	0	60	0	41	1	18	1	13	3	16	1
Communications.....	48	113	0	100	0	1	0	2	0	0	0	1	0	9	0
Telephone communications.....	481	60	0	51	0	0	0	0	0	0	0	1	0	8	0
Other communications.....	482-484,489	53	0	49	0	1	0	2	0	0	0	0	0	1	0
Electric, gas, and sanitary services....	49	110	6	4	0	54	0	27	1	16	1	9	3	1	1
Other transportation and utilities.....	40-42,44-47	101	0	72	0	6	0	12	0	2	0	3	0	6	0
Trade.....	50-59	3,752	0	3,368	0	222	0	127	0	8	0	6	0	21	0
Finance, insurance, and real estate.....	60-65,67	392	0	332	0	7	0	31	0	6	0	9	0	8	0
Services.....	701,72,73,75-81, 83,84,87,89	6,170	5	5,886	2	117	1	113	0	20	1	23	1	11	0
Business services.....	73	3,448	0	3,279	0	76	0	65	0	13	0	8	0	8	0
Computer and data processing services.....	737	3,069	0	2,924	0	72	0	53	0	10	0	5	0	4	0
Other business services.....	731-736,738	380	0	354	0	4	0	11	0	3	0	3	0	4	0

See explanatory information and SOURCE at end of table.

Table A-37. Number of companies performing industrial energy R&D and total number of R&D-performing companies, by industry and by size of company: 1998

Page 3 of 3

Industry	SIC code	Total		Size of company											
				Fewer than 500 employees		500 to 999 employees		1,000 to 4,999 employees		5,000 to 9,999 employees		10,000 to 24,999 employees		25,000 or more employees	
		Total	Energy	Total	Energy	Total	Energy	Total	Energy	Total	Energy	Total	Energy	Total	Energy
Health services.....	80	482	0	475	0	1	0	3	0	1	0	2	0	0	0
Offices and clinics of medical doctors , hospitals, medical and dental labs.....	801,806,807	365	0	361	0	1	0	1	0	0	0	2	0	0	0
Other health services.....	802-805,808-809	118	0	115	0	0	0	2	0	1	0	0	0	0	0
Engineering and management services.....	87	1,776	5	1,704	2	36	1	26	0	4	1	4	1	2	0
Engineering, architectural, and surveying.....	871	491	3	453	0	13	1	20	0	2	1	3	1	0	0
Research, development, and testing.....	873	940	2	930	2	8	0	1	0	0	0	0	0	1	0
Other engineering and management services.....	872,874	345	0	321	0	14	0	5	0	2	0	1	0	1	0
Other services.....	701,72,75-79,81, 83,84,89	464	0	428	0	4	0	20	0	2	0	9	0	1	0
Other nonmanufacturing industries ¹	07-12,14,15, 161-162,17	10,477	2	10,429	0	22	0	15	1	9	0	1	0	1	1

¹ Manufacturing companies with fewer than 50 employees and nonmanufacturing companies with fewer than 15 employees were sampled separately without regard to industry classification to minimize year-to-year variation in survey estimates. Estimates for manufacturing companies in this group are combined with those for companies in "Other manufacturing industries." Estimates for nonmanufacturing companies in this group are combined with those for companies in "Other nonmanufacturing industries."

NOTES: Energy R&D data are collected only on Form RD-1, the questionnaire sent to larger R&D-performing companies. Consequently, the universe of companies that perform energy R&D may not be represented by the statistics in this table. See the technical notes in Section B for more information on Form RD-1 and Form RD-1A.

SOURCE: National Science Foundation/Division of Science Resources Studies, Survey of Industrial Research and Development: 1998

Table A-38. Total (company, Federal, and other) funds for industrial R&D performance by State for selected years: 1979–98

Page 1 of 2

State	1979	1981	1983	1985	1987	1989 ¹	1991 ^{1,2}	1993 ²	1995 ²	1997 ²	1998 ²
[In millions of dollars]											
United States, total.....	38,226	51,810	65,268	84,239	92,155	102,055	116,952	117,400	132,103	157,539	169,180
Alabama.....	62	100	187	(S)	1,523	430	596	(S) 557	686	(S) 589	707
Alaska.....	(T)	(T)	(T)	(D)	10	9	21	14	30	24	189
Arizona.....	372	758	(T)	1,079	809	921	1,080	1,039	(S) 1,356	1,854	1,727
Arkansas.....	11	52	(T)	(D)	129	51	(S)	179	181	118	118
California.....	7,437	7,626	(T)	(S)	18,636	23,781	(S)	21,975	28,710	34,011	35,568
Colorado.....	269	529	741	988	1,207	1,167	(S)	1,966	1,865	2,248	3,565
Connecticut.....	985	1,514	1,682	2,129	2,121	2,421	1,756	2,228	3,906	3,014	3,113
Delaware.....	(T)	(T)	(T)	(D)	(D)	(D)	(D)	(S) 913	(S) 1,077	(S) 1,009	2,476
District of Columbia.....	33	(T)	(T)	(D)	(D)	(D)	46	(S) 515	(S) 672	(D)	(S) 503
Florida.....	620	1,449	(T)	1,973	2,041	2,352	(S)	2,386	4,101	3,442	3,300
Georgia.....	147	220	348	(D)	958	722	993	792	1,175	1,273	1,444
Hawaii.....	(T)	(T)	(T)	13	70	9	13	255	14	87	(S) 17
Idaho.....	(T)	(T)	(T)	451	467	(D)	(S)	686	827	(S) 1,181	(S) 1,028
Illinois.....	1,673	2,077	2,291	(D)	4,099	4,068	5,750	5,023	(S) 5,776	6,248	6,892
Indiana.....	723	1,054	(T)	(D)	1,860	1,823	2,274	2,141	(S) 2,721	2,677	(S) 2,622
Iowa.....	150	393	287	(D)	328	365	527	505	998	578	634
Kansas.....	216	211	293	(D)	1,128	406	(S)	(S) 280	569	(S) 1,136	(S) 1,279
Kentucky.....	209	170	191	(D)	238	227	176	282	452	359	427
Louisiana.....	83	158	257	(D)	128	169	(S)	106	61	172	102
Maine.....	40	(T)	(T)	(D)	39	33	(S)	(D)	286	83	82
Maryland.....	424	(T)	(T)	1,548	1,292	1,093	1,376	1,296	1,075	1,425	1,744
Massachusetts.....	1,690	1,907	2,466	4,495	5,255	5,851	(S)	5,960	7,416	8,300	10,604
Michigan.....	3,614	4,272	5,716	6,436	7,095	8,506	9,283	18,845	12,388	13,009	12,648
Minnesota.....	802	1,180	1,814	(D)	2,145	2,075	2,070	2,341	(S) 2,636	3,116	3,321
Mississippi.....	(T)	(T)	(T)	62	42	56	(S)	51	66	73	73
Missouri.....	746	1,137	(T)	(D)	1,823	2,391	(S)	(S) 1,339	(S) 2,028	(S) 1,290	(S) 1,313
Montana.....	(T)	(T)	(T)	(D)	7	(D)	(S)	(D)	17	92	82
Nebraska.....	15	28	26	(D)	59	64	67	93	150	71	93
Nevada.....	(T)	(T)	(T)	(S)	55	29	95	65	322	380	434
New Hampshire.....	(T)	(T)	(T)	(D)	90	(D)	(D)	247	472	652	1,187
New Jersey.....	2,191	3,355	4,364	5,975	5,876	6,410	8,933	8,009	8,200	11,069	10,415
New Mexico.....	(T)	(T)	(T)	(D)	950	1,039	1,217	(D)	1,461	(S) 1,310	(S) 1,205

See explanatory information and SOURCE at end of table.

Table A-38. Total (company, Federal, and other) funds for industrial R&D performance by State for selected years: 1979–98

Page 2 of 2

State	1979	1981	1983	1985	1987	1989 ¹	1991 ^{1,2}	1993 ²	1995 ²	1997 ²	1998 ²
[In millions of dollars]											
New York.....	2,959	4,057	5,951	7,561	6,276	8,107	9,457	8,597	8,651	(S) 9,939	11,176
North Carolina.....	327	546	786	(D)	1,666	1,311	1,470	1,886	2,226	3,590	3,362
North Dakota.....	(T)	(T)	(T)	10	57	(S)	(S)	(D)	12	33	34
Ohio.....	1,635	1,781	2,282	3,067	3,415	3,964	5,406	4,494	4,001	5,608	5,338
Oklahoma.....	174	339	407	(D)	367	333	448	299	288	428	245
Oregon.....	116	(T)	(T)	(D)	281	357	(S)	455	741	1,102	1,492
Pennsylvania.....	2,143	3,003	3,963	3,844	4,430	4,653	(S)	4,652	5,331	(S) 6,609	7,083
Rhode Island.....	49	87	171	213	224	140	174	154	520	(S) 704	(S) 1,320
South Carolina.....	82	(T)	(T)	(D)	500	388	479	461	739	(S) 783	695
South Dakota.....	(T)	(T)	(T)	(S)	4	4	6	(D)	19	26	5
Tennessee.....	(T)	(T)	(T)	(D)	621	934	843	788	1,003	1,089	2,040
Texas.....	1,233	(T)	(T)	3,762	4,077	5,051	5,439	4,562	(S) 6,211	7,265	8,408
Utah.....	142	265	242	(D)	774	389	407	279	803	1,027	1,109
Vermont.....	(T)	(T)	(T)	(D)	236	(D)	(D)	(D)	248	246	112
Virginia.....	464	539	941	862	1,284	1,131	1,275	1,046	1,577	1,767	2,707
Washington.....	(T)	(T)	(T)	2,351	2,939	2,728	3,677	(S) 4,575	(S) 4,294	(S) 6,610	(S) 7,476
West Virginia.....	(T)	(T)	(T)	(D)	83	(D)	(D)	(S) 100	243	(D)	(S) 225
Wisconsin.....	420	558	(T)	728	1,165	1,035	1,304	1,296	1,706	1,707	1,919
Wyoming.....	(T)	(T)	2	3	4	(D)	2	15	25	28	(S) 2
Undistributed funds.....	3,245	(T)	3,931	1,495	2,281	2,945	772	683	(S) 1,773	(S) 7,211	(S) 5,520

¹ As a result of a new sample design, statistics for 1989–91 have been revised since originally published. These statistics now better reflect R&D performance among firms in the nonmanufacturing industries and small firms in all industries. See the technical notes for more information.

² As a result of the new sample design, statistics for 1991 and later years are not directly comparable with statistics for 1990 and earlier years.

KEY: (D) = Data have been withheld to avoid disclosing information about individual companies.

(S) = Indicates imputation of more than 50 percent. For years prior to 1993, data have been withheld.

(T) = Data are not separately available but included in total.

NOTES: The 1993 data collected during the 1995 survey includes respondent revisions for both total R&D and State R&D allocations. Companies new to the survey may not have reported data by State on the report form they received and may not have had 1993 State data on their 1995 form. For these companies, 1993 State data were allocated to the State in which the company's headquarters was located.

SOURCE: National Science Foundation/Division of Science Resources Studies, Survey of Industrial Research and Development: 1998

**Table A-39. Total (company, Federal, and other) funds for industrial R&D performance,
by State and by source of funds: 1998**

Page 1 of 2

State	Total	Federal	Company
	[In millions of dollars]		
United States, total.....	169,180	24,164	145,017
Alabama.....	707	180	527
Alaska.....	189	180	9
Arizona.....	1,727	(S) 490	1,237
Arkansas.....	118	(D)	(D)
California.....	35,568	(S) 3,803	31,764
Colorado.....	3,565	1,237	2,329
Connecticut.....	3,113	179	2,935
Delaware.....	2,476	13	2,463
District of Columbia.....	(S) 503	90	413
Florida.....	3,300	889	2,411
Georgia.....	1,444	86	1,358
Hawaii.....	(S) 17	(D)	(D)
Idaho.....	(S) 1,028	(D)	(D)
Illinois.....	6,892	(S) 136	6,755
Indiana.....	(S) 2,622	(D)	(D)
Iowa.....	634	(D)	(D)
Kansas.....	(S) 1,279	(D)	(D)
Kentucky.....	427	(D)	(D)
Louisiana.....	102	14	87
Maine.....	82	(D)	(D)
Maryland.....	1,744	655	1,089
Massachusetts.....	10,604	(S) 2,419	8,185
Michigan.....	12,648	(D)	(D)
Minnesota.....	3,321	(S) 334	2,986
Mississippi.....	73	(S) 17	57
Missouri.....	(S) 1,313	(D)	(D)
Montana.....	82	(D)	(D)
Nebraska.....	93	(D)	(D)
Nevada.....	434	(D)	(D)
New Hampshire.....	1,187	(D)	(D)
New Jersey.....	10,415	(S) 134	10,282
New Mexico.....	(S) 1,205	(D)	(D)
New York.....	11,176	(S) 2,216	8,960
North Carolina.....	3,362	12	3,350
North Dakota.....	34	0	34
Ohio.....	5,338	605	4,732
Oklahoma.....	245	2	243
Oregon.....	1,492	(S) 26	1,467
Pennsylvania.....	7,083	(S) 485	6,598
Rhode Island.....	(S) 1,320	(D)	(D)
South Carolina.....	695	(D)	(D)
South Dakota.....	5	0	5
Tennessee.....	2,040	(D)	(D)
Texas.....	8,408	(S) 223	8,185

See explanatory information and SOURCE at end of table.

**Table A-39. Total (company, Federal, and other) funds for industrial R&D performance,
by State and by source of funds: 1998**

Page 2 of 2

State	Total	Federal	Company
	[In millions of dollars]		
Utah.....	1,109	(S) 181	928
Vermont.....	112	(S) 32	80
Virginia.....	2,707	1,614	1,093
Washington.....	(S) 7,476	(D)	(D)
West Virginia.....	(S) 225	(D)	(D)
Wisconsin.....	1,919	(D)	(D)
Wyoming.....	(S) 2	0	2
Undistributed funds.....	(S) 5,520	(S) 934	4,582

KEY: (D) = Data have been withheld to avoid disclosing operations of individual companies.
(S) = Indicates imputation of more than 50 percent.

NOTE: The R&D in this table is the industrial R&D performed within company facilities funded from all sources except the Federal Government. The funds predominantly are the company's own, but also include funds from outside organizations such as other companies, research institutions, universities and colleges, nonprofit organizations, and State governments. Excluded from this table are company-funded R&D not performed within the company (e.g., R&D contracted out to other organizations) and company-funded R&D not performed in the U.S. (e.g., R&D not performed on U.S. soil by foreign subsidiaries or other foreign organizations).

SOURCE: National Science Foundation/Division of Science Resources Studies, Survey of Industrial Research and Development: 1998

**Table A-40. Total (company, Federal, and other) funds for industrial R&D performance, by industry
and by size of company, for the U.S. and top 10 R&D-performing States: 1998**

Page 1 of 4

Industry and size of company	SIC code	U.S., total	California	Michigan	New York	Massachusetts	New Jersey	Texas	Washington	Pennsylvania	Illinois	Ohio	All other States plus undistributed
[In millions of dollars]													
Distribution by industry:													
All industries.....		169,180	35,568	12,648	11,176	10,604	10,415	8,408	(S) 7,476	7,083	6,892	5,338	53,576
Manufacturing.....		120,401	22,293	11,707	(S) 8,149	6,363	8,781	(S) 5,381	(S) 4,422	5,585	6,195	4,503	37,026
Food, kindred, and tobacco products.....	20,21	1,711	(S) 33	134	(S) 112	7	189	14	16	63	270	32	839
Textiles and apparel.....	22,23	(D)	(D)	0	(D)	16	0	40	0	12	(D)	(D)	453
Lumber, wood products, and furniture.....	24,25	374	31	(S) 88	4	0	(D)	3	(D)	5	5	(D)	233
Paper and allied products.....	26	(D)	(D)	(D)	(D)	25	(D)	(D)	82	168	21	24	1,109
Chemicals and allied products.....	28	21,764	1,710	995	2,616	(D)	3,728	419	(D)	2,304	(S) 1,317	1,133	6,771
Industrial chemicals.....	281-82,286	(D)	(D)	377	1,730	(S) 155	(S) 514	295	(D)	725	(D)	221	2,445
Drugs and medicines.....	283	12,571	1,338	(D)	597	352	2,953	(D)	(D)	1,513	(D)	(D)	3,825
Other chemicals.....	284-85,287-89	(D)	(D)	(D)	(S) 289	(D)	(S) 261	(D)	(D)	(S) 66	116	(D)	502
Petroleum refining and extraction.....	13,29	1,808	(D)	(D)	(D)	(D)	(D)	535	0	14	(D)	(D)	481
Rubber products.....	30	(D)	145	159	66	35	38	(D)	9	53	42	(S) 736	502
Stone, clay, and glass products.....	32	(D)	5	(S) 58	(D)	0	(D)	10	0	(S) 130	(D)	(S) 90	77
Primary metals.....	33	(D)	(D)	15	30	12	(D)	(S) 50	(D)	(S) 155	56	49	436
Ferrous metals and products.....	331-32, 3398-99	(D)	(D)	(D)	(D)	(D)	(D)	(D)	0	41	24	(D)	306
Nonferrous metals and products.....	333-36	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	31	(D)	130
Fabricated metal products.....	34	1,595	(S) 216	95	35	173	54	(D)	(D)	(S) 121	56	156	664
Machinery.....	35	14,919	4,957	362	355	485	(D)	(S) 741	(D)	527	904	346	4,590
Office, computing, and accounting machines.....	357	8,905	3,878	(D)	(D)	418	(D)	(D)	(D)	202	33	(S) 63	2,277
Other machinery, except electrical.....	351-56,358-59	6,014	1,079	(D)	(D)	67	82	(D)	86	325	871	283	2,313

See explanatory information and SOURCE at end of table.

**Table A-40. Total (company, Federal, and other) funds for industrial R&D performance, by industry
and by size of company, for the U.S. and top 10 R&D-performing States: 1998**

Page 2 of 4

Industry and size of company	SIC code	U.S., total	California	Michigan	New York	Massachusetts	New Jersey	Texas	Washington	Pennsylvania	Illinois	Ohio	All other States plus undistributed
[In millions of dollars]													
Distribution by industry:													
Electrical equipment.....	36	25,990	(S) 7,901	127	673	2,002	(D)	(S) 3,116	(D)	640	2,753	755	6,427
Radio and TV receiving equipment.....	365	155	22	(D)	0	(D)	0	0	(D)	(D)	(D)	0	24
Communication equipment....	366	(D)	(S) 1,125	(D)	68	812	(D)	(S) 1,718	(D)	(D)	(D)	89	3,425
Electronic components.....	367	(D)	5,921	24	142	543	52	(S) 1,314	81	(S) 212	210	(D)	1,345
Other electrical equipment....	361-64,369	4,811	(S) 834	59	464	(D)	(D)	(S) 83	11	137	(S) 218	(D)	1,634
Transportation equipment.....	37	29,279	(S) 3,760	9,532	(S) 2,796	(D)	64	132	(D)	378	167	894	8,263
Motor vehicles and motor vehicles equipment.....	371	(D)	(D)	(D)	(S) 56	(D)	(D)	(D)	(D)	(S) 35	104	669	1,726
Other transportation equipment.....	373-75,379	(D)	(S) 294	(D)	0	(D)	(D)	(D)	0	(D)	(D)	0	226
Aircraft and missiles.....	372,376	14,449	(D)	273	(S) 2,740	28	50	100	(D)	(D)	(D)	(S) 225	6,312
Professional and scientific instruments.....	38	(D)	2,810	(D)	(S) 1,102	(S) 2,784	(S) 1,198	91	104	(S) 933	(S) 373	162	4,993
Scientific and mechanical measuring instruments....	381-82	(D)	(S) 1,992	(D)	(D)	(S) 2,424	(D)	38	57	68	(D)	110	3,619
Optical, surgical, photographic, and other instruments.....	384-87	6,085	819	81	(D)	360	(D)	(S) 53	47	(S) 864	(D)	53	1,374
Other manufacturing industries ¹ ..	27,31,39	2,795	373	35	68	209	137	137	336	(S) 84	119	109	1,188
Nonmanufacturing		48,780	13,275	940	3,027	4,242	(S) 1,635	3,027	(S) 3,055	1,498	696	835	16,550
Transportation and utilities.....	40-42,44-49	(D)	195	14	(D)	(D)	(D)	84	(D)	(S) 217	(D)	22	1,025
Communications.....	48	(D)	169	0	(D)	(D)	(D)	(D)	0	(D)	0	0	(D)
Telephone communications.....	481	(D)	111	0	(D)	(D)	(D)	(D)	0	24	0	0	646
Other communications....	482-484,489	(D)	58	0	0	0	(D)	0	0	(D)	0	0	(D)
Electric, gas, and sanitary services.....	49	(D)	(D)	14	39	3	5	(D)	(D)	14	(D)	(D)	68
Other transportation and utilities.....	40-42,44-47	(D)	(D)	0	0	0	0	12	0	(D)	(D)	(D)	(D)

See explanatory information and SOURCE at end of table.

**Table A-40. Total (company, Federal, and other) funds for industrial R&D performance, by industry
and by size of company, for the U.S. and top 10 R&D-performing States: 1998**

Page 3 of 4

Industry and size of company	SIC code	U.S., total	California	Michigan	New York	Massachusetts	New Jersey	Texas	Washington	Pennsylvania	Illinois	Ohio	All other States plus undistributed
[In millions of dollars]													
Distribution by industry:													
Trade.....	50-59	11,336	3,313	286	1,369	(S) 1,771	140	415	79	260	67	30	3,607
Finance, insurance, and real estate.....	60-65,67	(D)	(S) 28	0	(D)	(D)	(D)	57	0	1	64	(D)	650
Services.....	701,72,73, 75-81,83, 84,87,89	29,281	8,049	501	1,077	1,799	(S) 744	2,133	(S) 2,876	976	513	641	9,972
Business services.....	73	15,222	3,558	322	805	812	(S) 455	1,431	(S) 2,695	218	(D)	266	4,521
Computer and data processing services....	737	(D)	3,502	319	794	(D)	(S) 414	1,391	(D)	210	132	(D)	4,339
Other business services..	731-736,738	(D)	57	3	11	(D)	41	40	(D)	8	(D)	(D)	182
Health services.....	80	1,207	63	(D)	(D)	0	(D)	517	0	(D)	0	9	82
Offices and clinics of medical doctors, hospitals, medical dental labs.....	801,806,807	1,096	5	(D)	0	0	(D)	517	0	(D)	0	(D)	43
Other health services.....	802-805, 808-809	111	58	0	(D)	0	7	0	0	0	0	(D)	39
Engineering and management services.....	87	11,835	4,340	175	266	986	(D)	185	(D)	179	362	353	4,566
Engineering, architectural, and surveying.....	871	2,025	510	23	26	(S) 99	48	(S) 91	12	10	(S) 16	36	1,153
Research, development, and testing.....	873	9,169	3,752	149	172	689	168	93	162	151	291	298	3,244
Other engineering and management services.	872,874	641	78	4	68	198	(D)	1	(D)	18	54	19	170
Other services.....	701,72,75-79, 81,83,84,89	1,017	88	(D)	(D)	(D)	(D)	0	(D)	(D)	(D)	14	802
Other nonmanufacturing industries ¹	07-12,14,15, 161-162,17	3,830	1,690	139	94	30	61	338	(D)	43	(D)	(D)	1,295

See explanatory information and SOURCE at end of table.

**Table A-40. Total (company, Federal, and other) funds for industrial R&D performance, by industry
and by size of company, for the U.S. and top 10 R&D-performing States: 1998**

Page 4 of 4

Industry and size of company		U.S., total	California	Michigan	New York	Massachusetts	New Jersey	Texas	Washington	Pennsylvania	Illinois	Ohio	All other States plus undistributed
[In millions of dollars]													
Distribution by size of company: [Number of employees]													
Total.....		169,180	35,568	12,648	11,176	10,604	10,415	8,408	(S) 7,476	7,083	6,892	5,338	53,576
Fewer than 500.....		30,175	9,127	1,028	2,588	2,177	570	1,308	1,145	721	664	570	10,276
500 to 999.....		5,495	1,635	(S) 102	220	619	147	99	74	199	138	398	1,864
1,000 to 4,999.....		21,525	6,074	753	730	1,368	872	770	192	1,619	859	535	7,752
5,000 to 9,999.....		14,053	3,169	627	(S) 676	904	1,441	(S) 894	50	440	374	588	4,890
10,000 to 24,999.....		24,876	2,833	961	(S) 960	(S) 1,875	2,673	(S) 2,475	(D)	(D)	(S) 731	(S) 697	7,445
25,000 or more.....		73,055	(S) 12,729	9,177	(S) 6,002	(S) 3,661	(S) 4,712	(S) 2,861	(D)	(D)	(S) 4,125	2,549	21,348

¹ Manufacturing companies with fewer than 50 employees and nonmanufacturing companies with fewer than 15 employees were sampled separately without regard to industry classification to minimize year-to-year variation in survey estimates. Estimates for manufacturing companies in this group are combined with those for companies in "Other manufacturing industries." Estimates for nonmanufacturing companies in this group are combined with those for companies in "Other nonmanufacturing industries."

KEY: (D) = Data have been withheld to avoid disclosing operations of individual companies.

(S) = Indicates imputation of more than 50 percent.

SOURCE: National Science Foundation/Division of Science Resources Studies, Survey of Industrial Research and Development: 1998

**Table A-41. Total (company, Federal, and other) funds for industrial R&D performance,
by industry, by size of company, and by type of cost: 1998**

Page 1 of 3

Industry and size of company	SIC code	Total R&D costs	Wages of R&D personnel	Materials and supplies	R&D depreciation	Other costs
Distribution by industry		[In millions of dollars]	[Percent]			
All industries.....		169,180	(S) 48.0	(S) 16.9	1.2	(S) 33.9
Manufacturing.....		120,401	(S) 44.9	(S) 19.1	1.3	(S) 34.8
Food, kindred, and tobacco products.....	20,21	1,711	48.3	10.7	1.3	39.8
Textiles and apparel.....	22,23	(D)	(S) 51.4	(S) 23.3	0.1	(S) 25.2
Lumber, wood products, and furniture.....	24,25	374	59.8	(S) 23.1	1.4	15.8
Paper and allied products.....	26	(D)	(S) 50.5	(S) 14.1	0.5	(S) 34.9
Chemicals and allied products.....	28	21,764	(S) 43.2	(S) 12.2	2.5	(S) 42.0
Industrial chemicals.....	281-82,286	(D)	(S) 52.0	(S) 12.7	1.6	(S) 33.7
Drugs and medicines.....	283	12,571	(S) 39.5	12.3	2.9	(S) 45.3
Other chemicals.....	284-85,287-89	(D)	46.1	9.3	3.0	41.6
Petroleum refining and extraction.....	13,29	1,808	(S) 43.3	(S) 14.0	1.2	(S) 41.4
Rubber products.....	30	(D)	(S) 48.4	23.3	0.5	(S) 27.8
Stone, clay, and glass products.....	32	(D)	(S) 39.7	15.7	3.1	41.5
Primary metals.....	33	(D)	57.4	13.3	0.4	(S) 28.9
Ferrous metals and products.....	331-32,3398-99	(D)	(S) 50.0	12.3	0.1	(S) 37.6
Nonferrous metals and products.....	333-36	(D)	71.3	15.3	1.0	(S) 12.4
Fabricated metal products.....	34	1,595	52.0	(S) 16.6	0.8	(S) 30.6
Machinery.....	35	14,919	37.8	14.2	1.7	46.3
Office, computing, and accounting machines.....	357	8,905	32.6	8.8	1.6	56.9
Other machinery, except electrical.....	351-56,358-59	6,014	47.0	23.2	1.9	28.0
Electrical equipment.....	36	25,990	(S) 50.6	(S) 20.9	1.3	(S) 27.2
Radio and TV receiving equipment.....	365	155	65.9	7.9	2.5	23.7
Communication equipment.....	366	(D)	(S) 53.1	(S) 27.0	0.4	(S) 19.5
Electronic components.....	367	(D)	(S) 49.6	(S) 15.9	2.1	(S) 32.4
Other electrical equipment.....	361-64,369	4,811	46.2	15.9	1.6	(S) 36.3
Transportation equipment.....	37	29,279	(S) 38.2	28.1	0.5	(S) 33.1
Motor vehicles and motor vehicles equipment.....	371	(D)	39.0	32.3	0.5	28.2
Other transportation equipment.....	373-75,379	(D)	(S) 55.5	19.7	0.0	24.8
Aircraft and missiles.....	372,376	14,449	(S) 36.8	(S) 24.5	0.5	(S) 38.2
Professional and scientific instruments.....	38	(D)	(S) 53.1	(S) 13.5	0.5	(S) 32.9
Scientific and mechanical measuring instruments.....	381-82	(D)	(S) 54.0	(S) 12.8	0.3	(S) 32.8
Optical, surgical, photographic, and other instruments.....	384-87	6,085	(S) 51.8	(S) 14.5	0.7	(S) 32.9
Other manufacturing industries ¹	27,31,39	2,795	(S) 79.5	9.4	0.3	10.8

See explanatory information and SOURCE at end of table.

**Table A-41. Total (company, Federal, and other) funds for industrial R&D performance,
by industry, by size of company, and by type of cost: 1998**

Page 2 of 3

Industry and size of company	SIC code	Total R&D costs	Wages of R&D personnel	Materials and supplies	R&D depreciation	Other costs
Distribution by industry		[In millions of dollars]			[Percent]	
Nonmanufacturing		48,780	59.0	(S) 9.7	1.3	30.1
Transportation and Utilities.....	40-42,44-49	(D)	(S) 52.3	(S) 7.9	0.9	(S) 38.8
Communications.....	48	(D)	(S) 52.0	(S) 7.1	1.1	(S) 39.8
Telephone communications.....	481	(D)	(S) 52.5	(S) 7.3	1.2	(S) 39.0
Other communications.....	482-484,489	(D)	49.4	5.8	0.0	44.8
Electric, gas, and sanitary services.....	49	(D)	(S) 41.7	17.9	0.0	40.4
Other transportation and utilities.....	40-42,44-47	(D)	66.8	8.5	0.0	24.7
Trade.....	50-59	11,336	55.1	12.0	2.9	30.0
Finance, insurance, and real estate.....	60-65,67	(D)	(S) 66.6	(S) 7.5	0.0	(S) 25.9
Services.....	701,72,73,75-81, 83,84,87,89	29,281	(S) 58.9	(S) 9.5	0.8	30.8
Business services.....	73	15,222	64.5	(S) 4.9	0.5	(S) 30.1
Computer and data processing services.....	737	(D)	64.5	(S) 4.9	0.5	(S) 30.1
Other business services.....	731-736,738	(D)	(S) 63.1	3.9	0.0	(S) 33.0
Health services.....	80	1,207	64.9	20.2	0.0	14.9
Offices and clinics of medical doctors, hospitals, medical and dental labs.....	801,806,807	1,096	64.8	21.5	0.0	13.7
Other health services.....	802-805,808-809	111	66.2	5.1	0.5	28.2
Engineering and management services.....	87	11,835	(S) 49.5	(S) 14.9	1.3	34.3
Engineering, architectural, and surveying.....	871	2,025	(S) 48.2	(S) 14.3	0.7	(S) 36.8
Research, development, and testing.....	873	9,169	48.0	(S) 15.7	1.4	34.9
Other engineering and management services.....	872,874	641	(S) 93.3	0.2	0.0	6.5
Other services.....	701,72,75-79,81, 83,84,89	1,017	86.3	2.8	0.3	10.5
Other nonmanufacturing industries ¹	07-12,14,15, 161-162,17	3,830	90.3	2.5	0.0	7.2

See explanatory information and SOURCE at end of table.

**Table A-41. Total (company, Federal, and other) funds for industrial R&D performance,
by industry, by size of company, and by type of cost: 1998**

Page 3 of 3

Industry and size of company	Total R&D costs	Wages of R&D personnel	Materials and supplies	R&D depreciation	Other costs
Distribution by size of company: [Number of employees]	[In millions of dollars]	[Percent]			
Total.....	169,180	(S) 48.0	(S) 16.9	1.2	(S) 33.9
Fewer than 500.....	30,175	78.1	5.9	0.8	15.2
500 to 999.....	5,495	53.0	13.3	1.7	32.1
1,000 to 4,999.....	21,525	49.7	12.6	2.4	35.3
5,000 to 9,999.....	14,053	(S) 50.9	(S) 15.2	1.1	(S) 32.7
10,000 to 24,999.....	24,876	(S) 48.2	(S) 14.4	1.4	(S) 36.0
25,000 or more.....	73,055	(S) 43.1	(S) 20.6	0.9	(S) 35.4

¹ Manufacturing companies with fewer than 50 employees and nonmanufacturing companies with fewer than 15 employees were sampled separately without regard to industry classification to minimize year-to-year variation in survey estimates. Estimates for manufacturing companies in this group are combined with those for companies in "Other manufacturing industries." Estimates for nonmanufacturing companies in this group are combined with those for companies in "Other nonmanufacturing industries."

KEY: (D) = Data have been withheld to avoid disclosing operations of individual companies.

(S) = Indicates imputation of more than 50 percent.

SOURCE: National Science Foundation/Division of Science Resources Studies, Survey of Industrial Research and Development: 1998

Table A-42. Number of full-time-equivalent (FTE) R&D scientists and engineers in R&D-performing companies, by industry and by size of company: 1988–99

Page 1 of 3

Industry and size of company	SIC code	1988 ²	1989 ²	1990 ²	1991 ^{2,3}	1992 ³	1993 ³	1994 ³	1995 ³	1996 ³	1997 ³	1998 ³	1999 ³
[In thousands]													
Total (Annual average) ¹		715.6	733.0	758.5	776.4	772.0	766.6	757.3	789.4	859.3	918.6	974.6	NA
Distribution by industry:													
Total (January).....		708.6	722.5	743.6	773.4	779.3	764.7	768.5	746.1	832.8	885.7	951.5	997.7
Manufacturing.....		606.7	597.3	NA	NA	576.7	568.2	571.1	547.2	606.2	639.9	682.1	659.1
Food, kindred, and tobacco products.....	20,21	(S)	(S)	(S)	9.4	9.8	9.6	10.3	8.9	9.8	10.4	11.0	10.4
Textiles and apparel.....	22,23	2.4	2.5	2.8	(S)	2.8	3.1	3.3	2.9	3.8	3.7	3.2	2.8
Lumber, wood products, and furniture.....	24,25	1.3	1.4	(S)	(S)	1.5	1.6	3.3	2.3	2.9	3.4	3.6	3.5
Paper and allied products.....	26	6.1	6.4	8.5	(S)	10.7	10.6	10.6	10.6	(S) 11.0	(S) 11.2	(S) 10.4	(S) 12.3
Chemicals and allied products.....	28	75.8	78.3	80.4	81.6	85.6	86.5	93.1	99.6	94.3	89.0	89.5	90.7
Industrial chemicals.....	281–82,286	(S)	(S)	(S)	(S)	29.9	26.4	28.8	33.7	28.4	31.2	26.7	26.6
Drugs and medicines.....	283	33.0	34.4	34.3	35.4	38.7	42.3	48.5	50.3	49.0	43.1	45.3	50.0
Other chemicals.....	284–85,287–89	20.3	18.8	18.9	17.0	17.0	17.8	15.8	15.6	16.9	14.8	17.5	14.1
Petroleum refining and extraction.....	13,29	9.5	10.7	11.1	11.4	11.5	11.0	9.7	8.4	8.4	9.0	7.9	8.0
Rubber products.....	30	(S)	(S)	(S)	(S)	14.8	13.0	9.0	9.8	10.2	9.9	11.5	12.8
Stone, clay, and glass products.....	32	8.6	7.6	7.0	6.0	5.3	5.1	4.0	4.3	3.9	3.7	(S) 3.9	4.0
Primary metals.....	33	5.6	5.5	5.2	4.6	5.1	4.6	5.1	6.5	4.1	(S) 5.5	(S) 6.4	6.1
Ferrous metals and products.....	331–32,3398–99	2.3	2.3	(S)	(S)	1.7	1.6	2.6	1.9	1.6	1.6	(S) 4.0	(S) 3.9
Nonferrous metals and products.....	333–36	3.3	3.3	3.3	3.0	(S)	(S)	2.5	4.6	2.5	(S) 3.9	2.5	2.2
Fabricated metal products.....	34	10.5	9.9	10.1	(S)	8.7	7.9	10.2	9.2	9.1	10.0	12.8	12.2
Machinery.....	35	98.4	100.4	113.3	109.7	99.3	97.4	70.4	68.6	87.3	88.7	112.1	96.1
Office, computing, and accounting machines.....	357	74.4	75.0	84.7	77.6	67.1	65.8	34.6	31.8	33.7	45.3	66.1	45.6
Other machinery, except electrical.....	351–56,358–59	24.0	25.4	28.6	32.1	32.2	31.6	35.8	36.8	53.6	43.4	46.0	50.5
Electrical equipment.....	36	132.5	122.5	105.2	95.9	91.9	89.2	96.5	103.3	125.8	135.9	171.6	(S) 173.8
Radio and TV receiving equipment.....	365	1.3	1.5	0.8	1.0	1.0	1.0	0.8	0.9	1.3	1.6	1.2	1.5
Communication equipment.....	366	73.1	58.0	47.1	35.8	31.2	(S)	(S) 36.0	(S) 41.7	(S) 34.7	(S) 37.6	69.0	(S) 92.3
Electronic components.....	367	44.3	42.8	(S)	32.6	28.4	28.9	40.1	40.8	(S) 64.6	(S) 75.3	(S) 66.8	(S) 53.1
Other electrical equipment.....	361–64,369	(S)	(S)	21.3	(S)	31.2	28.8	19.6	20.0	25.3	21.4	34.6	26.9

See explanatory information and SOURCE at end of table.

Table A-42. Number of full-time-equivalent (FTE) R&D scientists and engineers in R&D-performing companies, by industry and by size of company: 1988–99

Page 2 of 3

Industry and size of company	SIC code	1988 ²	1989 ²	1990 ²	1991 ^{2,3}	1992 ³	1993 ³	1994 ³	1995 ³	1996 ³	1997 ³	1998 ³	1999 ³
[In thousands]													
Distribution by industry:													
Transportation equipment.....	37	188.2	185.4	170.2	149.7	141.1	147.5	129.6	120.8	156.6	(S) 161.8	(S) 144.1	133.0
Motor vehicles and motor vehicles equipment.....	371	47.3	45.8	49.4	45.3	44.5	45.1	51.0	51.1	57.0	63.8	64.1	62.8
Other transportation equipment.....	373–75,379	(S)	(S)	(S)	(S)	(S)	(S)	(S) 5.8	6.2	4.0	3.4	3.1	(S) 3.8
Aircraft and missiles.....	372,376	136.4	134.8	115.3	100.2	92.9	97.9	72.8	63.5	95.5	(S) 94.6	(S) 77.0	(S) 66.4
Professional and scientific instruments.....	38	(S)	(S)	(S)	(S)	(S)	(S)	(S) 100.6	84.4	(S) 70.9	(S) 64.3	(S) 66.3	(S) 58.4
Scientific and mechanical measuring instruments.....	381–82	(S)	(S)	(S)	(S)	(S)	(S)	(S) 66.4	63.2	(S) 48.2	(S) 42.6	(S) 43.7	(S) 34.0
Optical, surgical, photographic, and other instruments.....	384–87	24.9	14.5	8.1	(S)	(S)	20.8	34.2	21.2	22.7	21.7	22.6	(S) 24.4
Other manufacturing industries ⁴	27,31,39	6.4	5.4	5.6	(S)	6.0	5.8	15.5	7.5	8.2	33.4	27.8	34.8
Nonmanufacturing ⁵		101.9	125.2	(S)	(S)	202.6	196.5	197.4	198.9	226.6	245.8	269.5	338.7
Transportation and utilities.....	40–42,44–49	NA	NA	NA	NA	NA	NA	NA	NA	29.3	29.4	15.2	(S) 16.1
Communications.....	48	NA	NA	NA	NA	NA	NA	NA	NA	25.4	24.7	(S) 8.4	(S) 14.1
Telephone communications.....	481	NA	NA	NA	NA	NA	NA	NA	NA	24.7	23.9	(S) 7.8	(D)
Other communications.....	482–484,489	NA	NA	NA	NA	NA	NA	NA	NA	0.8	0.8	0.6	(D)
Electric, gas, and sanitary services.....	49	NA	NA	NA	NA	NA	NA	NA	NA	(S) 3.2	(S) 4.0	1.1	1.0
Other transportation and utilities.....	40–42,44–47	NA	NA	NA	NA	NA	NA	NA	NA	0.7	0.8	5.7	1.0
Trade.....	50–59	NA	NA	NA	NA	NA	NA	NA	NA	47.5	39.6	46.4	65.0
Finance, insurance, and real estate.....	60–65,67	NA	NA	NA	NA	NA	NA	NA	NA	5.6	15.9	(S) 18.3	17.5
Services.....	701,72,73,75–81, 83,84,87,89	NA	NA	NA	NA	NA	NA	NA	NA	139.6	143.9	168.7	196.7
Business services.....	73	NA	NA	NA	NA	NA	NA	NA	NA	80.2	87.8	105.1	127.5
Computer and data processing services.....	737	NA	NA	NA	NA	NA	NA	NA	NA	77.3	85.1	102.6	122.8
Other business services.....	731–736,738	NA	NA	NA	NA	NA	NA	NA	NA	3.0	2.8	2.5	4.7
Health services.....	80	NA	NA	NA	NA	NA	NA	NA	NA	5.0	6.6	4.7	4.6
Offices and clinics of medical doctors, hospitals, medical and dental labs.....	801,806,807	NA	NA	NA	NA	NA	NA	NA	NA	4.4	6.3	4.0	3.4
Other health services.....	802–805,808–809	NA	NA	NA	NA	NA	NA	NA	NA	0.6	(S) 0.3	0.7	1.2

See explanatory information and SOURCE at end of table.

Table A-42. Number of full-time-equivalent (FTE) R&D scientists and engineers in R&D-performing companies, by industry and by size of company: 1988–99

Page 3 of 3

Industry and size of company	SIC code	1988 ²	1989 ²	1990 ²	1991 ^{2,3}	1992 ³	1993 ³	1994 ³	1995 ³	1996 ³	1997 ³	1998 ³	1999 ³
[In thousands]													
Engineering and management services.	87	NA	NA	NA	NA	NA	NA	NA	NA	52.9	45.3	54.5	57.6
Engineering, architectural, and surveying.....	871	NA	NA	NA	NA	NA	NA	NA	NA	(S) 22.8	18.0	20.9	16.5
Research, development, and testing.	873	NA	NA	NA	NA	NA	NA	NA	NA	28.8	24.9	28.3	34.8
Other engineering and management services.....	872,874	NA	NA	NA	NA	NA	NA	NA	NA	1.4	(S) 2.3	5.3	6.3
Other services.....	701,72,75–79,81, 83,84,89	NA	NA	NA	NA	NA	NA	NA	NA	1.5	4.2	4.4	7.0
Other nonmanufacturing industries ⁴	07–12,14,15, 161–162,17	NA	NA	NA	NA	NA	NA	NA	NA	4.6	17.0	20.8	43.4
Distribution by size of company: [Number of employees]													
Total.....		708.6	722.5	743.6	773.4	779.3	764.7	768.5	746.1	832.8	885.7	951.5	997.7
Fewer than 500.....		109.0	105.4	(S)	(S)	142.1	125.1	148.6	139.8	165.1	177.3	201.8	231.0
500 to 999.....		19.3	18.0	18.6	18.6	46.2	46.1	27.9	29.7	36.6	37.7	41.3	44.5
1,000 to 4,999.....		81.9	76.1	75.4	79.3	94.2	99.3	108.9	110.8	124.4	131.6	137.8	139.9
5,000 to 9,999.....		40.2	47.3	57.2	55.1	57.6	56.4	60.3	52.8	61.1	82.2	100.6	103.3
10,000 to 24,999.....		94.5	87.0	73.9	90.3	99.9	102.6	90.6	91.8	97.0	104.9	116.5	122.2
25,000 or more.....		363.7	388.7	404.2	408.4	339.2	335.2	332.1	321.2	348.6	(S) 351.9	(S) 353.5	356.8

¹The annual average number of full-time-equivalent (FTE) R&D scientists and engineers is the arithmetic mean of the numbers of R&D scientists and engineers reported for January in two consecutive years. The result is attributed to the earlier year.

²As a result of a new sample design, statistics for 1988–91 have been revised since originally published. These statistics now better reflect R&D performance among firms in the nonmanufacturing industries and small firms in all industries.

³As a result of the new sample design, statistics for 1991 and later years are not directly comparable with statistics for 1990 and earlier years.

⁴Beginning in 1996 manufacturing companies with fewer than 50 employees and nonmanufacturing companies with fewer than 15 employees were sampled separately without regard to industry classification to minimize year-to-year variation in survey estimates. Estimates for manufacturing companies in this group are combined with those for companies in "Other manufacturing industries." Estimates for nonmanufacturing companies in this group are combined with those for companies in "Other nonmanufacturing industries." As a result, statistics for "Other manufacturing industries" and for "Other nonmanufacturing industries" after 1995 are not comparable with statistics for prior years.

⁵Until 1995, data were not broken down below this level of detail for most nonmanufacturing industries.

KEY: (D) = Data have been withheld to avoid disclosing operations of individual companies.

(S) = Indicates imputation of more than 50 percent. For years prior to 1993, data have been withheld.

NA = Not available.

SOURCE: National Science Foundation/Division of Science Resources Studies, Survey of Industrial Research and Development: 1998

Table A-43. Number of full-time equivalent (FTE) R&D scientists and engineers in R&D-performing companies, by industry, by size of company, and by source of R&D funds: January 1999

Page 1 of 2

Industry	SIC code	Total	Federal	Company
Distribution by industry:		[In thousands]		
All industries.....		997.7	(S) 100.0	897.7
Manufacturing.....		659.1	(S) 77.7	(S) 581.5
Food, kindred, and tobacco products.....	20,21	10.4	0.0	10.4
Textiles and apparel.....	22,23	2.8	(D)	(D)
Lumber, wood products, and furniture.....	24,25	3.5	(D)	(D)
Paper and allied products.....	26	(S) 12.3	(D)	(D)
Chemicals and allied products.....	28	90.7	(S) 0.6	90.1
Industrial chemicals.....	281-82,286	26.6	(S) 0.4	(S) 26.2
Drugs and medicines.....	283	50.0	(D)	(D)
Other chemicals.....	284-85,287-89	14.1	(D)	(D)
Petroleum refining and extraction.....	13,29	8.0	(D)	(D)
Rubber products.....	30	12.8	(D)	(D)
Stone, clay, and glass products.....	32	4.0	(D)	(D)
Primary metals.....	33	6.1	(D)	(D)
Ferrous metals and products.....	331-32,3398-99	(S) 3.9	(D)	(D)
Nonferrous metals and products.....	333-36	2.2	(D)	(D)
Fabricated metal products.....	34	12.2	(D)	(D)
Machinery.....	35	96.1	(S) 0.4	95.7
Office, computing, and accounting machines.....	357	45.6	(D)	(D)
Other machinery, except electrical.....	351-56,358-59	50.5	(D)	(D)
Electrical equipment.....	36	(S) 173.8	(S) 16.8	(S) 157.0
Radio and TV receiving equipment.....	365	1.5	0.0	1.5
Communication equipment.....	366	(S) 92.3	(D)	(D)
Electronic components.....	367	(S) 53.1	(S) 0.2	(S) 52.9
Other electrical equipment.....	361-64,369	26.9	(D)	(D)
Transportation equipment.....	37	133.0	(S) 44.0	89.0
Motor vehicles and motor vehicles equipment.....	371	62.8	(D)	(D)
Other transportation equipment.....	373-75,379	(S) 3.8	(D)	(D)
Aircraft and missiles.....	372,376	(S) 66.4	(S) 42.2	24.2
Professional and scientific instruments.....	38	(S) 58.4	(S) 13.0	(S) 45.4
Scientific and mechanical measuring instruments.....	381-82	(S) 34.0	(D)	(D)
Optical, surgical, photographic, and other instruments.....	384-87	(S) 24.4	(D)	(D)
Other manufacturing industries ¹	27,31,39	34.8	(D)	(D)
Nonmanufacturing		338.7	(S) 22.3	316.4
Transportation and utilities.....	40-42,44-49	(S) 16.1	(D)	(D)
Communications.....	48	(S) 14.1	(D)	(D)
Telephone communications.....	481	(S) 9.2	(D)	(D)
Other communications.....	482-484,489	(D)	(D)	(D)
Electric, gas, and sanitary services.....	49	1.0	(D)	(D)
Other transportation and utilities.....	40-42,44-47	1.0	0.0	(S) 1.0

See explanatory information and SOURCE at end of table.

Table A-43. Number of full-time equivalent (FTE) R&D scientists and engineers in R&D-performing companies, by industry, by size of company, and by source of R&D funds: January 1999

Page 2 of 2

Industry	SIC code	Total	Federal	Company
Distribution by industry:		[In thousands]		
Trade.....	50-59	65.0	(S) 0.4	64.6
Finance, insurance, and real estate.....	60-65,67	17.5	0.0	17.5
Services.....	701,72,73,75-81, 83,84,87,89	196.7	(S) 16.5	180.2
Business services.....	73	127.5	2.5	125.0
Computer and data processing services.....	737	122.8	(D)	(D)
Other business services.....	731-736,738	4.7	(D)	(D)
Health services.....	80	4.6	(D)	(D)
Offices and clinics of medical doctors, hospitals, medical and dental labs.....	801,806,807	3.4	(D)	(D)
Other health services.....	802-805,808-809	1.2	(D)	(D)
Engineering and management services.....	87	57.6	(S) 13.8	43.8
Engineering, architectural, and surveying.....	871	16.5	(S) 8.7	7.8
Research, development, and testing.....	873	34.8	(D)	(D)
Other engineering and management services.....	872,874	6.3	(D)	(D)
Other services.....	701,72,75-79,81, 83,84,89	7.0	(D)	(D)
Other nonmanufacturing industries ¹	07-12,14,15, 161-162,17	43.4	(D)	(D)
Distribution by size of company: [Number of employees]				
Total.....		997.7	(S) 100.0	897.7
Fewer than 500.....		231.0	5.8	225.2
500 to 999.....		44.5	1.9	42.6
1,000 to 4,999.....		139.9	(S) 4.2	135.7
5,000 to 9,999.....		103.3	(S) 3.1	(S) 100.2
10,000 to 24,999.....		122.3	(S) 6.2	116.1
25,000 or more.....		356.8	(S) 78.9	(S) 277.9

¹ Manufacturing companies with fewer than 50 employees and nonmanufacturing companies with fewer than 15 employees were sampled separately without regard to industry classification to minimize year-to-year variation in survey estimates. Estimates for manufacturing companies in this group are combined with those for companies in "Other manufacturing industries." Estimates for nonmanufacturing companies in this group are combined with those for companies in "Other nonmanufacturing industries."

KEY: (D) = Data have been withheld to avoid disclosing operations of individual companies.

(S) = Indicates imputation of more than 50 percent.

NOTE: The company R&D in this table is the industrial R&D performed within company facilities funded from all sources except the Federal Government. The funds predominantly are the company's own, but also include funds from outside organizations such as other companies, research institutions, universities and colleges, nonprofit organizations, and State governments. Excluded from this table are company-funded R&D not performed within the company (e.g., R&D contracted out to other organizations) and company-funded R&D not performed in the U.S. (e.g., R&D not performed on U.S. soil by foreign subsidiaries or other foreign organizations).

SOURCE: National Science Foundation/Division of Science Resources Studies, Survey of Industrial Research and Development: 1998

Table A-44. R&D funds per scientist or engineer in R&D-performing companies, by industry and by size of company: 1988–98

Page 1 of 4

Industry and size of company	SIC code	1988 ³	1989 ³	1990 ³	1991 ^{3,4}	1992 ⁴	1993 ⁴	1994 ⁴	1995 ⁴	1996 ⁴	1997 ⁴	1998 ⁴
[In dollars]												
Distribution by industry:												
All industries.....		132,300	134,500	141,300	148,600	157,912	153,336	157,459	167,339	168,362	171,495	173,585
Manufacturing.....		NA	NA	NA	NA	NA	NA	163,508	173,523	179,538	183,097	179,551
Food, kindred, and tobacco products.....	20,21	(D)	(D)	(D)	130,000	144,215	135,261	152,494	167,017	154,853	166,821	159,251
Textiles and apparel.....	22,23	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)
Lumber, wood products, and furniture.....	24,25	(D)	(S)	(S)	(D)	(D)	(D)	(D)	(D)	(D)	99,055	104,429
Paper and allied products.....	26	(D)	(S)	(S)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)
Chemicals and allied products.....	28	139,400	149,000	159,000	167,600	183,508	(D)	(D)	180,971	(D)	(D)	241,640
Industrial chemicals.....	281–82,286	(S)	(S)	(S)	181,000	193,871	(D)	(D)	(D)	(D)	(D)	(D)
Drugs and medicines.....	283	142,800	(D)	(D)	(D)	196,631	202,607	190,662	205,637	212,185	262,201	263,791
Other chemicals.....	284–85,287–89	105,600	(D)	(D)	(D)	135,423	(D)	(D)	(D)	158,355	(D)	(D)
Petroleum refining and extraction.....	13,29	182,700	194,000	201,800	217,000	205,318	208,360	202,587	209,495	189,981	(D)	228,309
Rubber products.....	30	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)
Stone, clay, and glass products.....	32	(D)	(D)	(D)	(D)	(D)	137,990	141,251	110,172	124,685	(S) 160,632	(D)
Primary metals.....	33	118,600	(S)	(D)	142,200	114,057	138,552	115,371	111,743	(D)	(S) 165,397	(D)
Ferrous metals and products.....	331–32,3398–99	(S)	(D)	(D)	(D)	(D)	138,851	(D)	(D)	(D)	(D)	(D)
Nonferrous metals and products.....	333–36	(S)	(D)	(D)	(D)	(D)	(S) 138,326	(D)	(D)	(D)	(D)	(D)
Fabricated metal products.....	34	88,100	(S)	(S)	115,500	123,828	129,131	111,431	112,010	(D)	158,211	127,637
Machinery.....	35	(D)	130,000	138,500	147,800	152,797	100,631	(D)	(D)	152,894	184,263	143,282
Office, computing, and accounting machines.....	357	(D)	(D)	(D)	(D)	(D)	99,564	(D)	(D)	(D)	230,471	159,339
Other machinery, except electrical.....	351–56,358–59	99,400	(D)	(D)	(D)	(D)	102,213	112,692	111,421	(D)	126,651	124,681

See explanatory information and SOURCE at end of table.

Table A-44. R&D funds per scientist or engineer in R&D-performing companies, by industry and by size of company: 1988–98

Page 2 of 4

Industry and size of company	SIC code	1988 ³	1989 ³	1990 ³	1991 ^{3,4}	1992 ⁴	1993 ⁴	1994 ⁴	1995 ⁴	1996 ⁴	1997 ⁴	1998 ⁴
[In dollars]												
Distribution by industry:												
Electrical equipment.....	36	124,100	132,400	142,800	147,100	150,118	144,725	152,615	163,626	171,907	159,879	(S) 150,462
Radio and TV receiving equipment.....	365	124,200	103,400	113,200	(D)	(D)	(D)	(D)	(D)	(D)	(D)	112,924
Communication equipment....	366	160,300	170,600	177,100	(S)	(D)						
Electronic components.....	367	(S)	(S)	128,400	(D)	127,801	154,366	148,071	(D)	(D)	(D)	(D)
Other electrical equipment....	361–64,369	68,500	(S)	(S)	(D)	(D)	(D)	(D)	(D)	(D)	175,531	156,599
Transportation equipment.....	37	195,600	211,700	215,700	189,400	191,274	196,777	216,686	233,968	(S) 205,665	(S) 209,164	(S) 211,270
Motor vehicles and motor vehicles equipment.....	371	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)
Other transportation equipment.....	373–75,379	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)
Aircraft and missiles.....	372,376	193,300	207,300	213,700	177,000	180,552	176,450	186,898	213,328	(S) 170,733	(S) 189,972	(S) 201,493
Professional and scientific instruments.....	38	(S)	(S)	(S)	(S)	(S)	(S) 115,180	146,585	154,251	(S) 179,723	(S) 206,112	(D)
Scientific and mechanical measuring instruments.....	381–82	(S)	(S)	(S)	(S)	(S)	(S) 94,036	140,971	128,237	(D)	(S) 188,560	(D)
Optical, surgical, photographic, and other instruments.....	384–87	316,700	(S)	(S)	(S)	(S)	161,721	159,723	220,383	(D)	240,293	(S) 259,180
Other manufacturing industries ¹	27,31,39	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	91,458	89,324
Nonmanufacturing ²		74,900	(S)	(S)	137,400	152,411	159,188	140,374	150,578	138,882	141,730	160,428
Transportation and utilities.....	40–42,44–49	NA	NA	NA	NA	NA	NA	NA	370,933	159,442	135,133	(D)
Communications.....	48	NA	NA	NA	NA	NA	NA	NA	(D)	(D)	(D)	(D)
Telephone communications.....	481	NA	NA	NA	NA	NA	NA	NA	(D)	(D)	(D)	(D)
Other communications.....	482–484,489	NA	NA	NA	NA	NA	NA	NA	157,435	94,495	84,028	(D)
Electric, gas, and sanitary services.....	49	NA	NA	NA	NA	NA	NA	NA	(S) 274,704	(S) 98,427	(D)	(D)
Other transportation and utilities.....	40–42,44–47	NA	NA	NA	NA	NA	NA	NA	(D)	(D)	(D)	(D)

See explanatory information and SOURCE at end of table.

Table A-44. R&D funds per scientist or engineer in R&D-performing companies, by industry and by size of company: 1988–98

Page 3 of 4

Industry and size of company	SIC code	1988 ³	1989 ³	1990 ³	1991 ^{3,4}	1992 ⁴	1993 ⁴	1994 ⁴	1995 ⁴	1996 ⁴	1997 ⁴	1998 ⁴
[In dollars]												
Distribution by industry:												
Trade.....	50-59	NA	NA	NA	NA	NA	NA	NA	(D)	146,774	(D)	203,524
Finance, insurance, and real estate.....	60-65,67	NA	NA	NA	NA	NA	NA	NA	(D)	(D)	(D)	(D)
Services.....	701,72,73, 75-81,83, 84,87,89	NA	NA	NA	NA	NA	NA	NA	256,085	134,175	143,277	160,259
Business services.....	73	NA	NA	NA	NA	NA	NA	NA	231,680	126,625	123,974	130,910
Computer and data processing services.....	737	NA	NA	NA	NA	NA	NA	NA	234,483	(D)	124,766	(D)
Other business services....	731-736,738	NA	NA	NA	NA	NA	NA	NA	158,453	(D)	95,896	(D)
Health services.....	80	NA	NA	NA	NA	NA	NA	NA	305,132	(D)	(D)	257,703
Offices and clinics of medical doctors, hospitals, medical and dental labs.....	801,806,807	NA	NA	NA	NA	NA	NA	NA	(D)	(S) 133,871	(D)	293,435
Other health services.....	802-805, 808-809	NA	NA	NA	NA	NA	NA	NA	(D)	(D)	(S) 100,372	116,774
Engineering and management services.....	87	NA	NA	NA	NA	NA	NA	NA	289,459	149,040	186,234	211,088
Engineering, architectural, and surveying.....	871	NA	NA	NA	NA	NA	NA	NA	(S) 257,067	(S) 81,271	104,608	108,047
Research, development, and testing.....	873	NA	NA	NA	NA	NA	NA	NA	(D)	204,445	(D)	290,737
Other engineering and management services.....	872,874	NA	NA	NA	NA	NA	NA	NA	(D)	(S) 93,929	(D)	110,737
Other services.....	701,72,75-79, 81,83,84,89	NA	NA	NA	NA	NA	NA	NA	221,147	(D)	(D)	179,048
Other nonmanufacturing industries ¹	07-12,14,15, 161-162,17	NA	NA	NA	NA	NA	NA	NA	179,020	(D)	85,625	119,333

See explanatory information and SOURCE at end of table.

Table A-44. R&D funds per scientist or engineer in R&D-performing companies, by industry and by size of company: 1988-98

Page 4 of 4

Industry and size of company		1988 ³	1989 ³	1990 ³	1991 ^{3,4}	1992 ⁴	1993 ⁴	1994 ⁴	1995 ⁴	1996 ⁴	1997 ⁴	1998 ⁴
[In dollars]												
Distribution by size of company: [Number of employees]												
Total.....		132,300	134,500	141,300	148,600	157,912	153,336	157,459	167,339	168,362	171,495	173,585
Fewer than 500.....		67,100	66,200	(S)	103,400	111,358	106,888	97,012	109,319	118,280	126,925	139,430
500 to 999.....		(S)	98,200	(S)	178,700	176,585	87,233	123,239	141,660	124,765	125,611	128,106
1,000 to 4,999.....		100,600	101,900	91,400	119,400	127,135	128,565	134,558	144,213	142,747	145,436	155,058
5,000 to 9,999.....		100,400	102,500	110,800	150,800	148,285	156,899	144,327	167,284	161,035	156,090	137,803
10,000 to 24,999.....		143,000	127,300	135,300	167,300	156,190	160,229	172,678	180,849	199,722	194,323	208,403
25,000 or more.....		160,700	168,200	193,700	180,100	182,839	184,804	193,002	200,606	(S) 199,286	(S) 207,375	205,706

¹ Beginning in 1996 manufacturing companies with fewer than 50 employees and nonmanufacturing companies with fewer than 15 employees were sampled separately without regard to industry classification.

to minimize year-to-year variation in survey estimates. Estimates for manufacturing companies in this group are combined with those for companies in "Other manufacturing industries." Estimates for nonmanufacturing companies in this group are combined with those for companies in "Other nonmanufacturing industries." As a result, statistics for "Other manufacturing industries" and for "Other nonmanufacturing industries" after 1995 are not comparable with statistics for prior years.

² Until 1995, data were not broken down below this level of detail for most nonmanufacturing industries.

³ As a result of a new sample design, statistics for 1988-91 have been revised since originally published. These statistics now better reflect R&D performance among firms in the nonmanufacturing industries and small firms in all industries.

⁴ As a result of the new sample design, statistics for 1991 and later years are not directly comparable with statistics for 1990 and earlier years. See the technical notes for more information.

KEY: (D) = Data have been withheld to avoid disclosing operations of individual companies.

(S) = Indicates imputation of more than 50 percent. For years prior to 1993, data have been withheld.

(NA) = Not available.

NOTES: The number of full-time-equivalent R&D scientists and engineers used to estimate the cost per R&D scientist or engineer is the arithmetic mean of the numbers of R&D scientists and engineers reported for January in two consecutive years. This number is then divided into the total R&D expenditures of the earlier year, and the ratio is attributed to the earlier year.

SOURCE: National Science Foundation/Division of Science Resources Studies, Survey of Industrial Research and Development: 1998

Table A-45. R&D funds per scientist or engineer in R&D-performing companies, by industry, by size of company: 1998

Page 1 of 3

Industry	SIC code	Total	Size of company					
			Fewer than 500 employees	500 to 999 employees	1,000 to 4,999 employees	5,000 to 9,999 employees	10,000 to 24,999 employees	25,000 or more employees
[In dollars]								
All industries.....		173,585	139,430	128,106	155,058	137,803	208,403	(S) 205,706
Manufacturing.....		179,551	119,608	118,108	163,769	157,262	207,905	(S) 201,535
Food, kindred, and tobacco products.....	20,21	159,251	80,761	90,033	120,996	(S) 149,261	149,131	(S) 225,149
Textiles and apparel.....	22,23	(D)	124,098	99,961	116,834	(S) 350,996	(S) 136,124	(D)
Lumber, wood products, and furniture.....	24,25	104,429	59,614	94,224	112,575	137,691	(S) 103,633	0
Paper and allied products.....	26	(D)	105,691	(D)	175,846	(S) 175,014	(S) 156,159	(S) 136,039
Chemicals and allied products.....	28	241,640	352,424	156,794	201,153	220,633	262,769	243,900
Industrial chemicals.....	281-82,286	(D)	569,051	203,611	206,114	269,327	222,173	(D)
Drugs and medicines.....	283	263,791	201,454	111,314	247,931	227,992	314,219	246,451
Other chemicals.....	284-85,287-89	(D)	90,874	103,072	(S) 106,414	156,354	(D)	(D)
Petroleum refining and extraction.....	13,29	228,309	124,047	98,133	221,087	(D)	191,891	(S) 273,823
Rubber products.....	30	(D)	78,613	115,758	137,765	(S) 295,680	152,386	(D)
Stone, clay, and glass products.....	32	(D)	43,673	(S) 83,485	104,961	(S) 145,988	(S) 180,148	0
Primary metals.....	33	(D)	162,425	78,905	(S) 133,913	(S) 147,997	(S) 165,881	(S) 159,160
Ferrous metals and products.....	331-32,3398-99	(D)	558,037	70,267	(S) 101,629	(S) 141,187	(D)	(D)
Nonferrous metals and products.....	333-36	(D)	36,797	79,495	(S) 164,706	(D)	(D)	(D)
Fabricated metal products.....	34	127,637	57,515	97,864	74,381	136,340	147,433	(D)
Machinery.....	35	143,282	106,946	95,401	156,628	(S) 83,077	219,876	(D)
Office, computing, and accounting machines.....	357	159,339	93,402	141,885	217,617	145,284	194,341	(D)
Other machinery, except electrical.....	351-56,358-59	124,681	115,326	79,812	117,631	(S) 55,398	271,551	(D)
Electrical equipment.....	36	(S) 150,462	129,718	123,767	158,018	151,540	(S) 152,933	(S) 152,880
Radio and TV receiving equipment.....	365	112,924	146,745	(D)	(D)	0	0	0
Communication equipment.....	366	(D)	123,496	(S) 109,297	112,605	(S) 76,059	0	(S) 157,044
Electronic components.....	367	(D)	121,741	147,805	206,859	262,647	(S) 138,543	(D)
Other electrical equipment.....	361-64,369	156,599	156,257	103,083	141,420	(S) 168,747	236,266	153,361
Transportation equipment.....	37	(S) 211,270	224,587	(S) 63,536	140,288	134,950	176,896	(S) 219,527
Motor vehicles and motor vehicles equipment.....	371	(D)	200,237	(D)	155,410	(S) 137,669	160,014	(D)
Other transportation equipment.....	373-75,379	(D)	227,230	(D)	(D)	(D)	(D)	(D)
Aircraft and missiles.....	372,376	(S) 201,493	(D)	(D)	99,062	(S) 125,658	(D)	(S) 205,437

See explanatory information and SOURCE at end of table.

Table A-45. R&D funds per scientist or engineer in R&D-performing companies, by industry, by size of company: 1998

Page 2 of 3

Industry	SIC code	Total	Size of company					
			Fewer than 500 employees	500 to 999 employees	1,000 to 4,999 employees	5,000 to 9,999 employees	10,000 to 24,999 employees	25,000 or more employees
[In dollars]								
Professional and scientific instruments.....	38	(D)	135,337	141,431	169,332	255,133	(S) 228,932	(S) 314,421
Scientific and mechanical measuring instruments.....	381-82	(D)	112,160	150,800	116,131	290,586	(D)	(D)
Optical, surgical, photographic, and other instruments.....	384-87	(S) 259,180	188,544	118,963	217,265	236,411	(D)	(D)
Other manufacturing industries ¹	27,31,39	89,324	76,273	102,830	143,868	(S) 187,408	(S) 167,701	(D)
Nonmanufacturing.....		160,428	150,740	141,658	135,867	89,988	209,935	233,787
Transportation and utilities.....	40-42,44-49	(D)	101,169	(S) 121,661	141,912	122,666	390,089	(S) 174,574
Communications.....	48	(D)	186,517	(D)	(D)	(S) 0	(D)	(S) 195,892
Telephone communications.....	481	(D)	254,120	0	0	(S) 0	(D)	(S) 220,542
Other communications.....	482-484,489	(D)	126,612	(D)	(D)	0	0	(D)
Electric, gas, and sanitary services.....	49	(D)	(S) 40,540	(D)	121,209	188,044	360,437	(D)
Other transportation and utilities.....	40-42,44-47	(D)	47,642	(D)	(D)	(D)	(D)	84,935
Trade.....	50-59	203,524	143,110	133,951	143,081	157,517	(D)	(D)
Finance, insurance, and real estate.....	60-65,67	(D)	(S) 39,860	36,204	102,971	(S) 91,035	(D)	54,438
Services.....	701,72,73,75-81, 83,84,87,89	160,259	164,449	148,442	135,141	64,848	203,721	(S) 331,090
Business services.....	73	130,910	111,462	122,867	131,729	69,735	(D)	(D)
Computer and data processing services.....	737	(D)	112,430	124,801	131,498	69,482	(D)	(D)
Other business services.....	731-736,738	(D)	88,572	76,736	(S) 145,965	(D)	(D)	(D)
Health services.....	80	257,703	385,839	(D)	(D)	(D)	(D)	0
Offices and clinics of medical doctors, hospitals, medical and dental labs.....	801,806,807	293,435	554,786	(D)	(D)	0	(D)	0
Other health services.....	802-805,808-809	116,774	119,423	0	(D)	(D)	0	0
Engineering and management services.....	87	211,088	216,888	200,485	(S) 159,297	(D)	(D)	(D)
Engineering, architectural, and surveying.....	871	108,047	106,325	113,324	(D)	(D)	(D)	0
Research, development, and testing.....	873	290,737	260,658	271,695	(D)	0	0	(D)
Other engineering and management services.....	872,874	110,737	192,007	(S) 164,661	119,863	(D)	(D)	0

See explanatory information and SOURCE at end of table.

Table A-45. R&D funds per scientist or engineer in R&D-performing companies, by industry, by size of company: 1998

Page 3 of 3

Industry	SIC code	Total	Size of company					
			Fewer than 500 employees	500 to 999 employees	1,000 to 4,999 employees	5,000 to 9,999 employees	10,000 to 24,999 employees	25,000 or more employees
[In dollars]								
Other services.....	701,72,75-79,81, 83,84,89	179,048	178,784	(S) 25,876	(S) 148,774	(D)	(D)	(D)
Other nonmanufacturing industries ¹	07-12,14,15, 161-162,17	119,333	124,994	(D)	(S) 189,626	(S) 142,785	(D)	(D)

¹ Manufacturing companies with fewer than 50 employees and nonmanufacturing companies with fewer than 15 employees were sampled separately without regard to industry classification to minimize year-to-year variation in survey estimates. Estimates for manufacturing companies in this group are combined with those for companies in "Other manufacturing industries." Estimates for nonmanufacturing companies in this group are combined with those for companies in "Other nonmanufacturing industries."

KEY: (D) = Data have been withheld to avoid disclosing operations of individual companies.
 (S) = Indicates imputation of more than 50 percent.

NOTES: The number of full-time-equivalent R&D scientists and engineers used to estimate the cost per R&D scientist or engineer is the arithmetic mean of the numbers of R&D scientists and engineers reported for January in two consecutive years. This number is then divided into the total R&D expenditures of the earlier year, and the ratio is attributed to the earlier year.

SOURCE: National Science Foundation/Division of Science Resources Studies, Survey of Industrial Research and Development: 1998

Table A-46. R&D funds per scientist or engineer in R&D-performing companies ranked by size of R&D program: 1988–98

Companies ranked by size of R&D program	1988 ¹	1989 ¹	1990 ¹	1991 ^{1,2}	1992 ²	1993 ²	1994 ²	1995 ²	1996 ²	1997 ²	1998 ²
[In dollars]											
First 4.....	226,200	218,100	219,600	213,200	202,492	252,629	218,906	234,791	231,784	(S) 229,602	(S) 242,408
Next 4.....	210,700	225,800	249,000	223,700	238,950	199,559	(S) 245,626	(S) 188,928	(S) 185,032	180,389	193,597
Next 12.....	153,000	148,700	129,100	159,900	170,276	199,118	188,437	190,548	202,670	(S) 238,022	(S) 239,162
Next 20.....	154,500	132,500	145,800	(S)	(S)	(S)	182,699	204,159	210,552	213,496	196,276
Next 60.....	141,300	145,400	164,200	170,500	181,760	193,925	181,163	196,023	202,405	206,350	208,144
Next 100.....	137,300	141,900	137,000	169,000	173,101	138,227	174,524	162,707	160,560	155,255	162,965
Next 200.....	124,500	106,100	120,200	121,000	126,545	140,292	156,025	152,977	151,812	157,347	154,395
Average of above 400 R&D performing companies.....	160,600	161,500	161,200	169,000	158,098	154,814	174,536	167,339	168,362	171,495	173,585

¹ As a result of a new sample design, statistics for 1988–91 have been revised since originally published. These statistics now better reflect R&D performance among firms in the nonmanufacturing industries and small firms in all industries.

² As a result of the new sample design, statistics for 1991 and later years are not directly comparable with statistics for 1990 and earlier years. See the technical notes for more information.

KEY: (S) = Indicates imputation of more than 50 percent. Prior to 1993, data have been withheld.

NOTES: The number of full-time-equivalent R&D scientists and engineers used to estimate the cost per R&D scientist or engineer is the arithmetic mean of the numbers of R&D scientists and engineers reported for January in two consecutive years. This number is then divided into the total R&D expenditures of the earlier year, and the ratio is attributed to the earlier year.

SOURCE: National Science Foundation/Division of Science Resources Studies, Survey of Industrial Research and Development: 1998

Table A-47. Domestic employment of R&D-performing companies, by industry and by size of company: 1997–98

Page 1 of 5

Industry	SIC code	Total	Size of company							
			Fewer than 500 employees	500 to 999 employees	1,000 to 4,999 employees	5,000 to 9,999 employees	10,000 to 24,999 employees	25,000 or more employees		
[In thousands]										
1997										
All industries.....		20,221	1,975	790	2,860	2,254	3,188	9,154		
Manufacturing.....		11,700	1,235	626	2,090	1,403	2,170	4,176		
Food, kindred, and tobacco products.....	20,21	1,217	67	91	245	120	229	465		
Textiles and apparel.....	22,23	384	40	(D)	112	(D)	(D)	(D)		
Lumber, wood products, and furniture.....	24,25	252	20	41	68	65	59	0		
Paper and allied products.....	26	547	16	(S) 2	84	48	162	235		
Chemicals and allied products.....	28	1,019	72	23	205	195	276	248		
Industrial chemicals.....	281–82,286	411	16	(D)	86	83	(D)	(D)		
Drugs and medicines.....	283	316	23	2	54	49	89	99		
Other chemicals.....	284–85,287–89	292	33	(D)	64	63	(D)	(D)		
Petroleum refining and extraction.....	13,29	241	1	2	33	0	114	90		
Rubber products.....	30	475	73	62	149	(D)	(D)	(D)		
Stone, clay, and glass products.....	32	163	10	8	31	33	81	0		
Primary metals.....	33	494	12	34	82	122	143	102		
Ferrous metals and products.....	331–32,3398–99	301	2	2	41	101	(D)	(D)		
Nonferrous metals and products.....	333–36	193	10	32	41	(S) 21	(D)	(D)		
Fabricated metal products.....	34	681	127	(D)	160	64	(D)	(D)		
Machinery.....	35	1,387	204	74	324	204	275	305		
Office, computing, and accounting machines.....	357	419	20	(D)	44	61	(D)	(D)		
Other machinery, except electrical.....	351–56,358–59	968	184	(D)	281	144	(D)	(D)		
Electrical equipment.....	36	1,586	167	99	287	235	195	604		
Radio and TV receiving equipment.....	365	14	3	(D)	10	0	(D)	(D)		
Communication equipment.....	366	378	37	(D)	49	116	(D)	(D)		
Electronic components.....	367	491	83	(D)	96	69	(D)	(D)		
Other electrical equipment.....	361–64,369	703	44	37	132	50	109	331		
Transportation equipment.....	37	1,834	40	42	54	101	134	1,463		
Motor vehicles and motor vehicles equipment.....	371	1,023	(D)	39	18	(D)	102	766		
Other transportation equipment.....	373–75,379	87	0	(D)	13	(D)	(D)	(D)		
Aircraft and missiles.....	372,376	725	(D)	(D)	23	38	(D)	(D)		

See explanatory information and SOURCE at end of table.

Table A-47. Domestic employment of R&D-performing companies, by industry and by size of company: 1997–98

Page 2 of 5

Industry	SIC code	Total	Size of company							
			Fewer than 500 employees	500 to 999 employees	1,000 to 4,999 employees	5,000 to 9,999 employees	10,000 to 24,999 employees	25,000 or more employees		
			[In thousands]							
			1997							
Professional and scientific instruments.....	38	676	90	40	158	72	43	272		
Scientific and mechanical measuring instruments.....	381–82	381	64	26	57	26	(D)	(D)		
Optical, surgical, photographic, and other instruments.....	384–87	295	26	15	101	46	(D)	(D)		
Other manufacturing industries.....	27,31,39	743	296	32	97	77	109	132		
Nonmanufacturing.....		8,521	740	164	770	851	1,018	4,978		
Transportation and utilities.....	40–42,44–49	3,980	15	4	142	438	166	3,215		
Communications.....	48	1,109	2	(D)	5	314	(D)	(D)		
Telephone communications.....	481	1,050	0	0	0	314	0	736		
Other communications.....	482–484,489	59	2	(D)	5	0	(D)	(D)		
Electric, gas, and sanitary services.....	49	525	3	(D)	128	(D)	(D)	(D)		
Other transportation and utilities.....	40–42,44–47	2,346	11	(D)	(S) 8	(D)	(D)	2,290		
Trade.....	50–59	1,655	272	10	162	137	508	567		
Finance, insurance, and real estate.....	60–65,67	584	33	(D)	62	68	(D)	(D)		
Services.....	701,72,73,75–81, 83,84,87,89	2,036	319	118	358	141	288	812		
Business services.....	73	1,318	172	56	139	97	76	777		
Computer and data processing services.....	737	510	163	(D)	108	65	(D)	(S) 90		
Other business services.....	731–736,738	807	9	(D)	32	32	(D)	687		
Health services.....	80	109	16	2	36	0	55	0		
Offices and clinics of medical doctors, hospitals, medical and dental labs.....	801,806,807	97	14	2	27	0	55	0		
Other health services.....	802–805,808–809	12	3	0	9	0	0	0		
Engineering and management services.....	87	325	108	29	50	(D)	(D)	(D)		
Engineering, architectural, and surveying.....	871	148	47	(D)	39	(D)	47	0		
Research, development, and testing.....	873	98	51	(D)	3	0	(D)	(D)		
Other engineering and management services.....	872,874	79	10	11	8	(D)	(D)	0		
Other services.....	701,72,75–79,81, 83,84,89	284	23	31	133	(D)	(D)	(D)		
Other nonmanufacturing industries.....	07–12,14,15, 161–162,17	266	101	(D)	46	67	(D)	(D)		

See explanatory information and SOURCE at end of table.

Table A-47. Domestic employment of R&D-performing companies, by industry and by size of company: 1997–98

Page 3 of 5

Industry	SIC code	Total	Size of company							
			Fewer than 500 employees	500 to 999 employees	1,000 to 4,999 employees	5,000 to 9,999 employees	10,000 to 24,999 employees	25,000 or more employees		
[In thousands]										
1998										
All industries.....		18,289	2,174	800	2,776	2,057	2,929	7,554		
Manufacturing.....		11,672	1,350	488	2,043	1,614	2,093	4,083		
Food, kindred, and tobacco products.....	20,21	1,150	53	35	145	142	218	557		
Textiles and apparel.....	22,23	358	12	(D)	82	49	118	(D)		
Lumber, wood products, and furniture.....	24,25	271	31	9	66	83	82	0		
Paper and allied products.....	26	623	28	14	133	79	139	231		
Chemicals and allied products.....	28	938	78	45	192	191	231	201		
Industrial chemicals.....	281–82,286	339	25	30	60	75	(D)	(D)		
Drugs and medicines.....	283	318	15	2	66	36	104	94		
Other chemicals.....	284–85,287–89	281	38	13	66	80	(D)	(D)		
Petroleum refining and extraction.....	13,29	303	10	(D)	11	(D)	135	89		
Rubber products.....	30	538	109	45	140	(D)	55	(D)		
Stone, clay, and glass products.....	32	209	22	3	29	76	79	0		
Primary metals.....	33	469	24	13	118	111	87	116		
Ferrous metals and products.....	331–32,3398–99	292	22	2	71	92	(D)	(D)		
Nonferrous metals and products.....	333–36	177	2	12	47	19	(D)	(D)		
Fabricated metal products.....	34	710	150	55	118	78	134	175		
Machinery.....	35	1,223	226	96	277	196	293	136		
Office, computing, and accounting machines.....	357	261	16	(D)	42	47	73	(D)		
Other machinery, except electrical.....	351–56,358–59	962	210	(D)	235	149	220	(D)		
Electrical equipment.....	36	1,395	122	69	248	158	238	559		
Radio and TV receiving equipment.....	365	15	2	(D)	12	0	0	(D)		
Communication equipment.....	366	338	11	(D)	41	(S) 37	(D)	241		
Electronic components.....	367	419	66	39	121	71	(D)	(D)		
Other electrical equipment.....	361–64,369	623	42	21	75	50	157	277		
Transportation equipment.....	37	2,105	70	(S) 2	254	160	109	1,509		
Motor vehicles and motor vehicles equipment.....	371	1,275	(D)	(D)	226	(D)	93	(D)		
Other transportation equipment.....	373–75,379	98	21	(D)	10	(D)	(D)	(D)		
Aircraft and missiles.....	372,376	733	(D)	(D)	18	43	(D)	655		

See explanatory information and SOURCE at end of table.

Table A-47. Domestic employment of R&D-performing companies, by industry and by size of company: 1997–98

Page 4 of 5

Industry	SIC code	Total	Size of company							
			Fewer than 500 employees	500 to 999 employees	1,000 to 4,999 employees	5,000 to 9,999 employees	10,000 to 24,999 employees	25,000 or more employees		
			[In thousands]							
			1998							
Professional and scientific instruments.....	38	653	75	43	145	90	70	229		
Scientific and mechanical measuring instruments.....	381–82	326	46	24	49	25	(D)	(D)		
Optical, surgical, photographic, and other instruments.....	384–87	327	28	19	96	65	(D)	(D)		
Other manufacturing industries ¹	27,31,39	728	342	33	85	69	105	94		
Nonmanufacturing.....		6,617	823	312	733	443	835	3,471		
Transportation and utilities.....	40–42,44–49	1,899	10	43	112	138	208	1,388		
Communications.....	48	801	3	(D)	(D)	0	(D)	(D)		
Telephone communications.....	481	(D)	1	0	0	0	(D)	736		
Other communications.....	482–484,489	(D)	2	(D)	(D)	0	0	(D)		
Electric, gas, and sanitary services.....	49	416	1	38	86	(D)	142	(D)		
Other transportation and utilities.....	40–42,44–47	682	7	(D)	(D)	(D)	(D)	582		
Trade.....	50–59	1,819	216	168	197	52	102	1,084		
Finance, insurance, and real estate.....	60–65,67	818	44	5	130	51	(D)	(D)		
Services.....	701,72,73,75–81, 83,84,87,89	1,769	410	82	257	138	368	514		
Business services.....	73	1,061	250	53	148	85	124	401		
Computer and data processing services.....	737	694	219	51	121	63	70	170		
Other business services.....	731–736,738	367	31	3	27	22	54	231		
Health services.....	80	82	23	(D)	7	(D)	(D)	0		
Offices and clinics of medical doctors, hospitals, medical and dental labs.....	801,806,807	63	17	(D)	(D)	0	(D)	0		
Other health services.....	802–805,808–809	19	6	0	(D)	(D)	0	0		
Engineering and management services.....	87	382	112	25	62	28	(D)	(D)		
Engineering, architectural, and surveying.....	871	159	36	(D)	47	(D)	53	0		
Research, development, and testing.....	873	104	58	(D)	(D)	0	0	(D)		
Other engineering and management services.....	872,874	118	17	10	(D)	(D)	(D)	42		

See explanatory information and SOURCE at end of table.

Table A-47. Domestic employment of R&D-performing companies, by industry and by size of company: 1997–98

Page 5 of 5

Industry	SIC code	Total	Size of company					
			Fewer than 500 employees	500 to 999 employees	1,000 to 4,999 employees	5,000 to 9,999 employees	10,000 to 24,999 employees	25,000 or more employees
			[In thousands]					
			1998					
Other services.....	701,72,75–79,81, 83,84,89	245	25	(D)	40	(D)	128	(D)
Other nonmanufacturing industries ¹	07–12,14,15, 161–162,17	311	143	14	38	63	(D)	(D)

¹ Manufacturing companies with fewer than 50 employees and nonmanufacturing companies with fewer than 15 employees were sampled separately without regard to industry classification to minimize year-to-year variation in survey estimates. Estimates for manufacturing companies in this group are combined with those for companies in "Other manufacturing industries." Estimates for nonmanufacturing companies in this group are combined with those for companies in "Other nonmanufacturing industries."

KEY: (D) = Data have been withheld to avoid disclosing operations of individual companies.
 (S) = Indicates imputation of more than 50 percent.

SOURCE: National Science Foundation/Division of Science Resources Studies, Survey of Industrial Research and Development: 1998

Table A-48. R&D scientists and engineers per 1,000 employees in R&D-performing companies, by industry and by size of company: 1988–98

Page 1 of 3

Industry and size of company	SIC code	1988 ²	1989 ²	1990 ²	1991 ^{2,3}	1992 ³	1993 ³	1994 ³	1995 ³	1996 ³	1997 ³	1998 ³
Distribution by industry:												
All industries ¹		NA	NA	NA	NA	NA	NA	44	47	49	47	55
Manufacturing.....		46	46	47	50	51	52	47	54	56	58	57
Food, kindred, and tobacco products.....	20,21	8	8	8	9	9	9	8	10	10	9	9
Textiles and apparel.....	22,23	(S)	(S)	6	7	8	7	7	10	9	8	8
Lumber, wood products, and furniture.....	24,25	5	5	6	5	6	16	7	12	10	14	13
Paper and allied products.....	26	11	13	16	17	19	19	15	(S) 20	20	(S) 19	(S) 20
Chemicals and allied products.....	28	69	69	69	69	71	80	84	78	85	88	97
Industrial chemicals.....	281–82,286	54	56	59	60	61	58	63	67	70	65	78
Drugs and medicines.....	283	94	92	96	95	116	138	141	141	142	143	157
Other chemicals.....	284–85, 287–89	60	60	53	53	43	51	53	38	49	60	50
Petroleum refining and extraction.....	13,29	24	26	26	26	27	27	23	26	32	33	26
Rubber products.....	30	(S)	26	32	38	33	24	21	21	22	24	24
Stone, clay, and glass products.....	32	26	26	24	24	23	21	19	22	19	(S) 24	19
Primary metals.....	33	12	12	11	11	11	11	14	9	14	(S) 13	13
Ferrous metals and products.....	331–32, 3398–99	9	8	7	7	7	9	7	6	8	(S) 13	(S) 13
Nonferrous metals and products.....	333–36	17	16	15	(S)	(S)	15	23	12	20	13	12
Fabricated metal products.....	34	17	(S)	20	19	16	21	15	15	17	19	17
Machinery.....	35	66	71	73	74	74	61	59	75	67	81	79
Office, computing, and accounting machines.....	357	114	126	131	137	139	124	157	173	163	158	175
Other machinery, except electrical.....	351–56, 358–59	29	31	33	36	37	41	39	55	42	47	53
Electrical equipment.....	36	71	68	66	67	65	75	75	91	98	108	(S) 125
Radio and TV receiving equipment.....	365	45	44	30	30	28	51	43	56	55	87	101
Communication equipment.....	366	94	96	89	91	(S)	(S)	(S) 153	(S) 147	(S) 163	182	(S) 273
Electronic components.....	367	100	96	89	95	92	122	104	(S) 142	137	(S) 136	(S) 127
Other electrical equipment.....	361–64,369	26	30	38	43	44	31	29	38	37	49	43

See explanatory information and SOURCE at end of table.

Table A-48. R&D scientists and engineers per 1,000 employees in R&D-performing companies, by industry and by size of company: 1988–98

Page 2 of 3

Industry and size of company	SIC code	1988 ²	1989 ²	1990 ²	1991 ^{2,3}	1992 ³	1993 ³	1994 ³	1995 ³	1996 ³	1997 ³	1998 ³
Distribution by industry:												
Transportation equipment.....	37	72	71	68	73	76	70	68	78	83	(S) 79	63
Motor vehicles and motor vehicles equipment.....	371	41	41	43	49	51	54	50	53	67	63	49
Other transportation equipment.....	373–75,379	40	52	45	(S)	(S)	(S)	43	26	12	35	(S) 39
Aircraft and missiles.....	372,376	103	101	96	98	101	94	108	121	134	(S) 106	(S) 91
Professional and scientific instruments.....	38	62	59	71	(S)	(S)	(S)	99	(S) 100	106	(S) 98	(S) 90
Scientific and mechanical measuring instruments.....	381–82	84	96	95	(S)	(S)	(S)	127	(S) 135	145	(S) 115	(S) 104
Optical, surgical, photographic, and other instruments.....	384–87	48	28	17	(S)	59	98	60	64	69	77	(S) 75
Other manufacturing industries.....	27,31,39	17	14	14	14	14	32	14	16	49	37	48
Nonmanufacturing ¹		NA	NA	NA	NA	NA	NA	36	35	36	32	51
Transportation and utilities.....	40–42,44–49	NA	NA	NA	NA	NA	NA	NA	14	15	4	(S) 9
Communications.....	48	NA	NA	NA	NA	NA	NA	NA	28	30	(S) 8	(S) 18
Telephone communications.....	481	NA	NA	NA	NA	NA	NA	NA	28	29	(S) 7	(D)
Other communications.....	482–484,489	NA	NA	NA	NA	NA	NA	NA	96	74	10	(D)
Electric, gas, and sanitary services.....	49	NA	NA	NA	NA	NA	NA	NA	(S) 6	7	2	3
Other transportation and utilities.....	40–42,44–47	NA	NA	NA	NA	NA	NA	NA	1	1	2	1
Trade.....	50–59	NA	NA	NA	NA	NA	NA	NA	25	25	28	36
Finance, insurance, and real estate.....	60–65,67	NA	NA	NA	NA	NA	NA	NA	13	22	(S) 31	21
Services.....	701,72,73, 75–81,83, 84,87,89	NA	NA	NA	NA	NA	NA	NA	75	65	83	111
Business services.....	73	NA	NA	NA	NA	NA	NA	NA	64	62	80	120
Computer and data processing services.....	737	NA	NA	NA	NA	NA	NA	NA	149	158	201	177
Other business services.....	731–736,738	NA	NA	NA	NA	NA	NA	NA	4	3	3	13
Health services.....	80	NA	NA	NA	NA	NA	NA	NA	35	73	43	57
Offices and clinics of medical doctors, hospitals, medical and dental labs.....	801,806,807	NA	NA	NA	NA	NA	NA	NA	38	85	41	54
Other health services.....	802–805, 808–809	NA	NA	NA	NA	NA	NA	NA	24	17	59	65

See explanatory information and SOURCE at end of table.

Table A-48. R&D scientists and engineers per 1,000 employees in R&D-performing companies, by industry and by size of company: 1988–98

Page 3 of 3

Industry and size of company	SIC code	1988 ²	1989 ²	1990 ²	1991 ^{2,3}	1992 ³	1993 ³	1994 ³	1995 ³	1996 ³	1997 ³	1998 ³
Distribution by industry:												
Engineering and management services.....	87	NA	NA	NA	NA	NA	NA	NA	163	89	168	151
Engineering, architectural, and surveying.....	871	NA	NA	NA	NA	NA	NA	NA	(S) 113	129	142	104
Research, development, and testing.....	873	NA	NA	NA	NA	NA	NA	NA	392	82	289	333
Other engineering and management services.....	872,874	NA	NA	NA	NA	NA	NA	NA	28	36	67	53
Other services.....	701,72, 75–79,81, 83,84,89	NA	NA	NA	NA	NA	NA	NA	10	21	16	28
Other nonmanufacturing industries.....	07–12,14,15, 161–162,17	NA	NA	NA	NA	NA	NA	NA	14	78	78	140
Distribution by size of company: [Number of employees]												
Total ¹		NA	NA	NA	NA	NA	NA	44	47	49	47	55
Fewer than 500.....		NA	NA	NA	NA	NA	NA	60	85	97	102	106
500 to 999.....		NA	NA	NA	NA	NA	NA	42	44	47	52	56
1,000 to 4,999.....		NA	NA	NA	NA	NA	NA	41	45	46	48	50
5,000 to 9,999.....		NA	NA	NA	NA	NA	NA	31	32	40	45	50
10,000 to 24,999.....		NA	NA	NA	NA	NA	NA	31	37	38	37	42
25,000 or more.....		NA	NA	NA	NA	NA	NA	48	45	45	(S) 39	47

¹ Until 1995, this table included only manufacturing companies.² As a result of a new sample design, statistics for 1988–91 have been revised since originally published. These statistics now better reflect R&D performance among firms in the nonmanufacturing industries and small firms in all industries.³ As a result of the new sample design, statistics for 1991 and later years are not directly comparable with statistics for 1990 and earlier years. See the technical notes for more information.

KEY: (D) = Data have been withheld to avoid disclosing operations of individual companies.

(S) = Indicates imputation of more than 50 percent. For years prior to 1993, data have been withheld.

NA = Not available.

NOTES: The number of R&D scientists and engineers per 1,000 employees for 1995 is derived by dividing the arithmetic mean of scientists and engineers employed in January 1995 and January 1996 by the number of employees in all activities in March 1995. Similar procedures were used for earlier years.

SOURCE: National Science Foundation/Division of Science Resources Studies, Survey of Industrial Research and Development: 1998

Table A-49. R&D funds per employee in R&D-performing companies, by size of company: 1988–98

Size of company [Number of employees]	1988 ¹	1989 ¹	1990 ¹	1991 ^{1,2}	1992 ²	1993 ²	1994 ²	1995 ²	1996 ²	1997 ²	1998 ²
Total (company, Federal, and other) R&D funds per employee [in dollars]											
Total.....	5,594	5,920	6,291	6,842	7,366	7,225	6,945	7,439	7,992	7,791	9,251
Fewer than 500.....	5,377	5,660	6,339	7,279	7,493	8,718	6,041	8,611	11,056	12,183	13,882
500 to 999.....	2,906	3,197	3,826	(T)	14,206	5,184	5,043	5,620	5,755	6,287	6,872
1,000 to 4,999.....	3,223	3,404	3,738	4,243	4,907	5,046	5,377	6,201	6,439	6,849	7,755
5,000 to 9,999.....	3,992	4,158	4,456	4,706	5,253	5,379	4,771	4,975	5,652	6,331	6,832
10,000 to 24,999.....	3,713	3,607	4,401	5,223	5,468	5,294	5,406	6,445	7,375	6,747	8,494
25,000 or more.....	7,388	7,863	8,005	8,252	8,908	9,123	9,305	8,738	8,890	7,990	9,671
Company and other (except Federal) R&D funds per employee [in dollars]											
Total.....	3,844	3,607	4,401	5,322	5,839	5,834	5,682	6,118	6,685	6,608	7,929
Fewer than 500.....	4,782	5,201	5,701	6,242	6,384	7,828	5,559	7,589	9,800	11,065	12,301
500 to 999.....	2,677	3,029	3,598	(T)	13,937	4,871	4,792	5,350	5,484	5,810	6,418
1,000 to 4,999.....	2,761	2,990	3,346	3,817	4,488	4,623	5,094	5,910	6,259	6,660	7,531
5,000 to 9,999.....	3,335	3,624	4,286	4,228	4,764	4,935	4,625	4,848	5,423	6,059	6,572
10,000 to 24,999.....	3,163	3,217	3,863	4,106	4,282	4,400	4,622	5,710	6,998	6,461	8,168
25,000 or more.....	4,402	5,016	5,251	5,739	6,404	6,691	6,783	6,363	6,455	5,884	7,254

¹ As a result of a new sample design, statistics for 1988–91 have been revised since originally published. These statistics now better reflect R&D performance among firms in the nonmanufacturing industries and small firms in all industries.

² As a result of the new sample design, statistics for 1991 and later years are not directly comparable with statistics for 1990 and earlier years. See the technical notes for more information.

KEY: (T) = Data not separately available, but are included in total.

NOTE: Averages were derived by dividing total and company R&D funds for a calendar year by employment data for March of that year.

SOURCE: National Science Foundation/Division of Science Resources Studies, Survey of Industrial Research and Development: 1998

Table A-50. Distribution of total employment in R&D-performing companies ranked by size of R&D program: 1988–98

Companies ranked by size of R&D program	1988 ¹	1989 ¹	1990 ¹	1991 ^{1, 2}	1992 ²	1993 ²	1994 ²	1995 ²	1996 ²	1997 ²	1998 ²
[Percent]											
Total.....	100	100	100	100	100	100	100	100	100	100	100
First 4 (1–4).....	7	7	7	7	7	6	6	6	6	5	5
Next 4 (5–8).....	3	3	3	3	3	2	2	2	2	3	3
Next 12 (9–20).....	6	6	5	5	5	5	4	4	4	3	4
Next 20 (21–40).....	5	4	5	4	4	4	4	4	4	4	4
Next 60 (41–100).....	9	10	9	9	8	8	7	7	7	5	7
Next 100 (101–200).....	8	8	8	10	9	9	8	7	8	9	8
Next 200 (201–400).....	9	9	11	10	10	10	9	9	9	17	11
All others.....	53	53	52	52	47	55	59	61	59	34	60

¹ As a result of a new sample design, statistics for 1988–91 have been revised. These statistics now better reflect R&D performance among firms in the nonmanufacturing industries and small firms in all industries.

² As a result of the new sample design, statistics for 1991 and later years are not directly comparable with statistics for 1990 and earlier years. See the technical notes for more information.

SOURCE: National Science Foundation/Division of Science Resources Studies, Survey of Industrial Research and Development: 1998